THIS WEEK IN THE
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Bars of A4615, like all Ryerson Alloys, are unmistakably identified by color marking and heat symbol. When transferred to the Ryerson Alloy Report, marking and symbol give a positive check between steel and accompanying hardenability data.

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Two Kinds of Productivity

TWO kinds of productivity are distinct and separate. They are total productivity and individual productivity. Today we have higher total productivity than we have ever had before in this country, and lower individual productivity than we have had during the past ten or fifteen years.

Today we have over 60 million people employed and at work. This is nearly 10 million more than we have had in any so called period of previous prosperity. No wonder total productivity is high.

But today it takes about 50 per cent more manhours to turn out an automobile than it did before the war and unit productivity, measured in hourly or daily output per man, has slipped in almost every line of productive endeavor.

I want to stress the importance of unit productivity, not merely because it is your baby and my baby whom we have nursed and nurtured but because it is the most important factor in our economy. Upon what we do with it depends the future of America and perhaps the world. What we do with it will decide whether we are to continue to progress in the direction of making more goods available for more and more people or whether we are to move into a shrinking economy in which the dollar sign on the pay envelope will have lost its relationship to buying power. And that's already happening as you know when you buy a haircut or a suit of clothes.

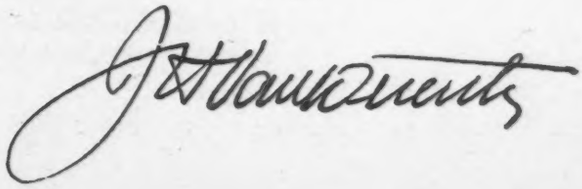
The men at the top of our principal organized labor groups know this to be true. Let me quote you from "Labor's Monthly Survey," published by the American Federation of Labor.

"Under our American free enterprise system, workers have made amazing progress in raising their standards of living in the last 30 years. Even after hours of work in industry had been reduced from an average of 54½ per week in 1911 to 40 per week in 1939, the increase in workers' wages was so great that their pay for the shorter week in 1939 was 37 per cent above what they received for the longer week in 1911. With 14½ hours more leisure per week and $450 more to spend per year, workers had better homes, better health, more time for their families and greater home comforts including autos, radios, home appliances, furniture, etc.

"Living standards do not rise by any magical formula. They can rise only when workers produce more per hour and per year of work. Production, per worker per year, in all private industry, rose 43 per cent from 1911 to 1939."

Let me repeat, for it is worth repeating: "Living standards do not rise by any magical formula. They can rise only when workers produce more per hour and per year of work." That is an economic truth that you can paste in your hat. Too bad that the top boys in the unions have not yet succeeded in spreading it down the line.

Maybe it's also too bad that they did not state that improvements in mechanization and technique, primarily supplied by management, formed the chief factor in the unit productivity rise that was so beneficial to labor.



The vast resources of the Inland Steel Company are important factors to volume users of steel.

Extensive mines and quarries...modern freighters...towering blast furnaces...the glowing open hearths and coke ovens... the powerful rolling mills, vibrant with action and life!

Activating these resources and modern facilities are Inland's experienced engineers and metallurgists applying their skills to every phase of development, production, and control...making certain that every ton of steel produced is worthy of the name...INLAND!

Yes, Inland has the resources to produce quality steel for you.

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Extra tons of scrap are needed to make the extra tons of steel for American industry. Please keep your scrap moving back to the mills.

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► Atomic power can be produced for peacetime use at a cost of approximately 0.8¢ per kw-hr, according to Dr. Charles A. Thomas, vice-president of Monsanto Chemical. Commenting on the fantastic density of an atomic nucleus he stated that if one could get 1 cc of the stuff nuclei are made of, it would weigh 100 million tons. Dr. Thomas' statement is based on a study made by the Monsanto staff at Oak Ridge for Bernard Baruch, U. S. Representative to the UN Atomic Energy Committee.

► Steel warehouse inventories are still in rather poor shape. All are affected by priority orders which have interfered with rolling schedules for the third quarter. In the Midwest the situation is further aggravated by Eastern mills' refusal to absorb long haul freight costs.

► The export licensing system is in a fair way to blowing to pieces with a repetition of the 1942 muddle. At present there is no valid check on the legitimacy of applications and no breakdown on South American licenses.

► During the war there were many undercover fights to see that priorities were evenly distributed on the basis of company capacity. Indications that the old fight will break out anew are seen in reports that while some steel companies have 15 to 20 pct of rated orders on their books, others have 10 pct or less.

► Washington observers are predicting that by early next year production will be restricted by labor shortages, rather than by lack of materials. The labor shortage is reportedly growing progressively worse.

► Nail production in November is expected to hit 66,000 tons. Some consideration is being given to the use of premium payments to boost output of housing type nails.

► No hope for improvement is seen in the cast iron soil pipe picture this year. In fact, it may be tighter in 1947, Washington sources predict.

► Because of a tendency to distort during heat treatment, long one-piece automobile bumpers which extend around the fenders have presented a difficult heat treating problem but austempering in a salt bath is reported to have limited distortion to 1/8 in.

► A new patented process for plating chromium and nickel simultaneously on carbon steel which requires no subsequent heat treatment is said to offer interesting possibilities for low cost heat and corrosion resistant steel for automobile mufflers and tail pipes.

► A British firm has secured remarkably good results in constructing a vibration-free base on poor soil for a 117-ton hobbing machine. The solution consisted of setting a concrete bed in a compressed cork cradle.

► Metallurgists at the Frankford Arsenal have adapted the precision casting process to perform the solution treatment phase of the heat treating cycle required for aluminum bronze and beryllium copper alloys. The insulating properties of the casting investment are used to accomplish this end.

► Heavy Alloy, a powder metallurgy product developed by General Electric of England, is reported to be as strong as steel but has twice its density. It opens up new possibilities to the machine designer for use as a balancing material where space is limited.

► A large manufacturer of electric motors reports delivery dates on small motors are still at 58 weeks.

► It is believed that the rockets now seen frequently over Sweden are being assembled in the huge underground factories east of Cassel in the Soviet-occupied zone of Germany where a stock of parts to make 2000 V-2 rockets were found at the war's end. This is only part of the large scale Russian armament industry in Germany.

► The impending ascendancy of German economic control in the British zone of Germany, replacing military government supervision, may start a new wave of denazification removals in industry there. Except for removal of familiar armament names the British have been content to retain efficient managers who had only a gray, and not a black Nazi record.

► Private firms can now send investigators to Germany at their own expense to study German technical developments if the thousands of documents translated in this country are insufficient for their needs.

► The famous German steel firm, Vereingte Stahlwerke, with a prewar capacity of 9.5 million metric tons of ingots will be completely wiped out and used for reparations.

► Not at all satisfied with OPA's denial of higher prices on steel scrap, all 26 chapters of the Institute of Scrap Iron & Steel have called meetings to determine a course of action. It is not expected that this collective blowing of tops will cause OPA to reconsider its recent double-cross, now known in certain segments of the trade as "Revolting No. 8."

A Critical Survey of *Controlled*

IN the past 20 years tremendous growth has taken place in the field of controlled atmospheres for thermal modification of metallurgical products. Prior to that time, however, all practical heat treating operations were performed in the absence of atmosphere control as it is now known and were, therefore, incapable of producing consistent results. As long as metallurgical processes were dependent upon the artistic skill of the men operating the equipment rather than upon sound knowledge and organized skill uniform results were unattainable.

Until the economic exigencies of the depression compelled industry to seek ways and means of reducing costs, while improving product appearance, no serious attention was directed toward the atmospheres in which annealing or other operations were performed on ferrous and nonferrous metals. Most such operations had been performed in furnaces through which the products of combustion of the fuels used for heating were circulated. There were many who were able to demonstrate, however, that circulation of flue-gas products around the work frequently produced results far inferior to those which could be obtained from performing the operations in sealed batch-type furnaces. Although no effort was made to control the initial atmosphere in the latter type, a condition of equilibrium was attained by interaction of the atmosphere constituents, the steel, the carbon in the steel charge, the furnace lining and other governing factors. Heat treaters, in general, guarded their own particular secrets very closely, though many so-called secret methods were universally used by men unknown to one another, as a natural result of inevitable progress.

The automotive industry successfully agitated for the steel producers to seek ways of satisfying the new quality control demands which grew out of the trend towards designing larger group assemblies, fenders, hoods and complete bodies, from deep-drawn low carbon steel sheet. The streamlined cars of simple-mass body unit construction were impossible until means were found of insuring the uniform quality of the sheet steel from which they were to be made. Therefore less than 20 years ago the first installation of a large, successful, controlled atmosphere generator was accomplished for the controlled bright annealing of automotive carbon steel.

The existing annealing furnaces were predominately oil or gas-fired. Since it was not economically possible to scrap and replace such units, modifications were made by installing muffles or by redesigning to permit effective sealing of whole furnaces against extraneous gases and, quite logically, atmosphere generators were made to control the production of non-oxidizing gases from gas or oil. Attempts to control the combustion of oil for atmosphere purposes met with repeated failures and ultimately all manufacturers of atmosphere generators turned to gas as the base.

Bright annealing operations were known to be dependent upon freedom from oxidation. Decarburization[1] or carburization problems were not significant in the control of low carbon steel sheet. The first generators, therefore, were operated to produce atmospheres slightly on the reducing side, as such atmospheres were cheapest in terms of fuel consumption and provided adequate control. The need for removal of water from the combusted gases resulted in the addition of direct contact spray towers. Where cooling water temperature was too high to lower the atmosphere dewpoint sufficiently, refrigerating units were added for occasional or continual use. Direct contact spray towers have largely given way to indirect condenser units where freedom from nitrous oxides and oxygen is essential to critical control. However, many large units in operation for controlled annealing of low carbon steel products, as well as for bright annealing of certain copper-base alloys, still use the direct spray cooled water removal methods.

The fact that the first control atmosphere generators were added to gas-heated furnaces gave the manufacturers of such types a lead in the field of controlled atmospheres which, coupled with the economy of using the same fuel as a source of heat as well as the base of the controlled atmosphere, still militates in favor of gas-heated, gas-controlled equipment installations. When the electrical industries began turning their attention toward the ever-growing field of controlled industrial furnace equipment, they soon found it necessary to find ways of counteracting the marked trade advantages possessed by their competitors. This resulted in a very favorable competitive research program which in conjunction with the stringent requirements placed on product quality and the great strain put on all mass production industries in the recent war, required the utmost concentrated progress in the new but important field of controlled atmospheres for thermal modifications.

Hundreds of atmospheres have been advanced, each having an advantage, real or imaginary, which has won for it some adherents. However, with the exception of special gases and metallic salt modifiers, all currently important controlled atmospheres are derived from combustion of fuel gases, cracking and combustion of anhydrous ammonia, cracking of fuel gases, partial combustion of charcoal, with a few using special gases as nitrogen and hydrogen, obtained in practice through certain of the foregoing processes. To simplify this study and the appli-

[1] *See also "Decarburization in Highly Stressed Steels,"* THE IRON AGE, *July 4, 1946, p. 52.*

Atmospheres

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Controlled atmospheres for various heat treatments of ferrous and nonferrous metals and alloys are evaluated from the standpoints of economics and metallurgical suitability. In this, the first part of a three-part article, the authors suggest a code system whereby the base atmospheres and their modifications can be readily and systematically identified.

cation of such information as contained herein, all subject atmospheres and their modifications have been condensed into a chart, table I, which shows three base groups of ten classes and their major modifications.

Group I lists four classes which are derived from various stages of burning and cracking fuel gases; group II consists of the three classes derived from dissociation, partial and complete combustion of anhydrous ammonia; and group III is intended to include all individual or special gases not directly obtained from either of the above two sources (for purposes of this survey, only three are listed, two of which are sometimes obtained by processing either fuel or ammonia gas).

Table I is not intended to exclude special atmospheres which may have real advantages, but in general those atmospheres not covered in the table are used for purposes other than simple bright annealing, normalizing or bright hardening. These three treat-

TABLE I

The Major Base Atmospheres and Their Modifications With a Simple Code Identification Method

Atmosphere Group and Class	General Composition Ranges, Pct						Sources and Production Methods
	CO	H_2	CO_2	H_2O	N_2	CH_4	
GROUP I							
1	0.0-3.5	0.1-4	5.0-14	Sat.	to 75	0.0	Fuel gases, completely burned
1A, c	0.0-3.5	0.1-4	5.0-14	60°F dp	to 80	0.0	Class 1 with surface condenser water removal
1A, r	0.0-3.5	0.1-4	5.0-14	40°F dp	to 81	0.0	Class 1 with refrigeration removal of water
1A, d	0.0-3.5	0.1-4	5.0-14	−20°F dp	to 81.5	0.0	Class 1 with desiccating dryers
1A, c, r, d	0.0-3.5	0.1-4	5.0-14	−65°F dp	to 82+	0.0	Class 1 with any or all three methods of drying
1B, d	0.0-3.5	0.1-4	0.0	−65°F dp	99.9+	0.0	Class 1 dried and freed of CO_2 and H_2S (Pura N_2)
1C (B, d)	0.0-3.5	0.1-4	0.0-14	to −65°F	to 93	1-10	Class 1 enriched, with drying and CO_2 removed as needed
2	4.0-12	3.0-21	4.0-9	Sat.	to 70	0.0-0.5	Fuel gases, partially burned
2A, c, r, d	4.0-12	3.0-21	4.0-9	to −65°F	to 88	0.0-0.5	Class 2 with any or all methods of water removal
2B, d	4.0-12	3.0-21	0.0	−65°F dp	to 92	0.0-0.5	Class 2 dried and freed of CO_2 and H_2S
2C (B, d)	4.0-12	3.0-21	0.0-9	to −65°F	to 91	0.5-10	Class 2 enriched, dried and CO_2 removed as needed
3	18-32	21-35	1.0-4	130°F dp	to 60	0.5-1	Fuel gases, partially cracked or reacted
3A, c, r, d	18-32	21-35	1.0-4	to −65°F	to 68	0.5-1	Class 3 with various stages of water removal
3B, d	18-32	21-35	0.0	−65°F	to 70	0.5-1	Class 3 dried and freed of CO_2 and H_2S
3C (B, d)	18-32	21-35	0.0-4	to −65°F	to 69	0.5-10	Class 3 enriched, dried and freed of CO_2 if needed
4	23-38	28-44	0.2-1.5	10°F dp	to 50	0.5-2	Fuel gases, completely cracked
4A, r, d	23-38	28-44	0.2-1.5	to −65°F	to 50	0.5-2	Class 4 refrigerated and desiccated
4B, d	23-38	28-44	0.0	−65°F	to 50	0.5-2	Class 4 dried and freed of CO_2 and H_2S
4C, (B, d)	23-38	28-44	0.0-1.5	to −65°F	to 50	0.5-10	Class 4 enriched, dried, freed of CO_2 as needed
GROUP II							
5	0.0	75	0.0	to −60°F	25	0.0	Anhydrous ammonia, catalytically dissociated
5A, d	0.0	75	0.0	−65°F	25	0.0	Class 5 desiccated to remove traces of H_2O and NH_3
5C, d	0.0	75	0.0	−65°F	25	0.5-10	Class 5 enriched, freed of H_2O and NH_3 as needed
6	0.0	2-50	0.0-0.1	to 20	to 74	0.0	Dissociated ammonia partially burned
6C	0.0	2-50	0.0-0.1	to 20	to 74	0.5-10	Class 6 enriched for carburization—rarely used
7	0.0	0.0-1	0.0-0.4	to 30	to 60	0.0	Dissociated ammonia completely burned
7A, d	0.0	0.0-1	0.0-0.4	−65°F	to 99	0.0	Class 7 completely dried with all stages H_2O removal
7B, d	0.0	0.0-1	0.0-0.4	−65°F	99.?+	0.0	Class 7 dried and freed of traces of CO_2 (pure N_2)
7C (B, d)	0.0	0.0-1	0.0-0.4	to −65°F	to 99.9	0.5-10	Class 7 enriched, dried, freed of CO_2 as needed
GROUP III							
8	0.0	0.0	0.0	10°F dp	99.8	0.0	Commercial tank nitrogen—traces of O_2
8A, d	0.0	0.0	0.0	−65°F	99.9+	0.0	Dried tank nitrogen still having traces of O_2
9	0.0	99	0.0	to 20°F	trace	0.0	Commercial tank hydrogen
9A, d	0.0	99.99+	0.0	−65°F	trace	0.0	Dried tank hydrogen
10	0.0-34	0.0-2.5	0.1-21	10-50°F	to 76	0.0-0.7	Charcoal generated CO atmospheres
10A, d	0.0-34	0.0-2.5	0.1-21	−65°F	to 76	0.0-0.7	Class 10 desiccated to remove H_2O
10B, d	0.0-34	0.0-2.5	0.0	−65°F	to 76	0.0-0.7	Class 10 dried and freed of CO_2
10C (B, d)	0.0-34	0.0-2.5	0.0-21	to −65°F	to 76	0.5-10	Class 10 enriched, freed of H_2O and CO_2 as needed

Usually the small letter *d* following any other modification indicates that only complete drying is done, if any at all is attempted, for that particular modification. Where all three stages of H_2O removal are indicated, in all cases any combination of them, or all of them, may be used. The breakdown of H_2O removal for Class 1 applies to the others as well, where the various steps are required or used in practice.

ments cover the bulk of thermal modifications with which this article is concerned.

The ten atmospheres are given a primary identifying number: 1 through 4 for group I, in the order of the appearance of each gas in actual practice; 5 through 7 for group II with the same sequence of development, and 8 through 10, arbitrarily assigned to group III gases. The three major modifying steps are indicated, for each class, by adding capital letters A, B and C to show, in order, a stage of water removal, removal of CO_2 and H_2S, and enrichment for carburizing purposes. The three major stages of water removal require an additional code which consists of the letters *c* for condenser removal, *r* for refrigeration and *d* for the use of silica gel or activated alumina desiccators. In use, the code can indicate any combination of the above modifications. In general when the letter *d* is used, following any capital letter, it is intended to indicate that total removal of water by all three steps of condensing, refrigerating and desiccating has been accomplished. Examples of the various atmosphere identifications are: (1) A completely burned fuel gas which has been dried by use of condenser and refrigerating equipment is indicated as class 1A, c, r; (2) an atmosphere of fully cracked fuel gas from which all water and CO_2 have been removed becomes class 4B, d (the *d* indicating total removal of H_2O by whatever steps required); and (3) totally combusted ammonia, dried, freed of CO_2 (inspirated with combustion air) and enriched for carburizing purposes is shown as class 7C (B, d) which is, incidently, pure nitrogen to which a raw fuel gas has been added. These examples are cited to indicate the fact that the code and chart are universally applicable to all commercially significant modifications of the ten base atmospheres. It might be mentioned parenthetically that if some such codification were established by one or more of the interested technical societies it would contribute greatly to industry by eliminating the welter of trade symbols and confusing names for the various modifications of the ten bases which are offered. It would

TABLE II

Cross-Correlation of Control Atmospheres with Methods of Treatment and Materials Treated—Ferrous Materials

	Tempering	Bright Annealing (and Process Annealing)				Normalizing				Bright Hardening (No Decarburizing)			Carburizing	Furnace Brazing and Soldering			Powdered Metals		
Atmosphere	All Steel	LCS	MCS	HCS	EL & HNS	LCS	MCS	HCS	EHNS	MCS	HCS	EL & HNS	All Types	MCS	HCS	EHNS	Fe	HAS	HTS
GROUP I																			
1	Y	S	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1A, c, r, d	***	Y	Y	S	..	Y	Y	..	..	..	S	..	..	Y	S	..	S	..	..
1B, d	..	..	..	S	S	..	..	S	S	S	S	S*	..	..	S	S	..	S	..
1C (B, d)	..	..	..	..	..	..	..	..	..	..	..	..	Y*	..	..	..	..	..	..
2	Y	S	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2A, c, r, d	..	Y	Y	S	..	Y	Y	S	..	Y	S	..	..	Y	S	S	S	..	..
2B, d	..	..	..	Y	S	..	..	Y	S	..	Y	S*	..	..	Y	S	Y	S	S
2C (B, d)	..	..	..	..	..	..	..	..	..	..	..	..	Y	..	..	..	..	..	..
3	N	Y*	Y	S*	..	Y*	Y	S	..	S	S*	..	..	Y*	..	..	S	..	..
3A, c, r, d	..	Y*	..	S*	..	..	..	S*	..	Y*	S*	..	..	..	S	S	Y*	..	..
3B, d	..	..	..	Y**	..	..	..	Y*	S*	..	Y**	S*	..	..	Y*	..	..	S	S
3C (B, d)	..	..	..	..	S*	..	..	..	..	..	..	..	Y*	..	..	..	..	..	..
4	N	Y*	Y*	S*	..	Y*	Y*	S	..	S*	S	..	..	Y*	..	..	..	..	..
4Ac, r, d	..	..	..	S*	..	..	..	S*	..	Y*	S*	..	..	..	S*	..	S*	S*	..
4B, d	..	..	..	Y**	..	..	..	Y*	S*	..	Y**	S*	..	..	Y*	S*	Y*	Y	S
4C (B, d)	..	..	..	..	S*	..	..	..	..	..	..	..	Y*	..	..	..	..	..	..
GROUP II																			
5	N	Y*	Y*	S*	S	Y*	Y*	S*	S	Y*	S*	S	..	Y*	S*	S	Y*	S*	S
5A, d	..	..	..	Y**	Y	..	..	S*	Y	..	S*	Y	..	..	S*	Y	..	..	Y
5C, d	..	..	..	..	..	..	..	..	..	..	..	..	Y*	..	..	..	..	..	..
6	S*	Y*	S*	..	..	Y*	..	..	S*	..	..	..	..	..	..	..	..	..	..
6C	..	..	..	..	..	..	..	..	..	..	..	..	S*	..	..	..	..	..	..
7	Y*	S*	..	..	..	S*	..	..	..	..	..	..	..	..	..	..	..	..	..
7A, d	..	Y*	Y*	..	..	Y*	Y*	S*	S*	S*	S*	S*	..	Y*	S*	..	S*	..	..
7B, d	..	..	..	S*	S*	..	..	S*	S*	S*	S*	S*	..	..	S*	S*	..	S	..
7C (B, d)	..	..	..	..	..	..	..	..	..	..	..	..	Y*	..	..	..	..	..	..
GROUP III																			
8	N	Y*	Y*	..	..	Y*	Y*	S*	S*	S*	S*	S*	..	Y*	S*	..	S*	..	..
8A, d	..	..	..	S*	S*	..	..	S*	S*	S*	S*	S*	..	..	S*	S*	..	S*	..
9	N	Y*	Y*	S*	S	Y*	Y*	S*	S	Y*	S*	S	..	Y*	S*	S	S*	S*	S
9A, d	..	..	..	S*	Y	..	..	S*	Y	..	S*	Y	..	..	..	Y	..	..	Y
10	Y*	Y*	Y*	S	..	Y*	Y	S	..	S	S	..	..	Y*	S*	..	Y*	S*	..
10A, d	..	..	..	S*	S*	..	..	S*	S*	Y*	S*	..	..	..	S*	..	..	S*	..
10B, d	..	..	..	Y**	S*	..	..	S*	S*	..	Y**	S*	..	..	Y*	S*	..	Y*	S*
10C (B, d)	..	..	..	..	..	..	..	..	..	..	..	..	Y*	..	..	..	..	..	..

Abbreviations at column heading are identified as follows: *LCS*—low carbon steel; *MCS*—medium carbon steel; *HCS*—high carbon steel (in general, includes alloy tool steels insofar as the general atmosphere effects are concerned); *EL&HNS (EHNS)*—electrical and high nickel steels for electrical purposes (includes high chromium steels which must be handled in the same atmospheres); *Fe*—iron (powders); *HAS*—high alloy steel (powders); *HTS*—high tungsten steel, including pure tungsten powders which are essentially handled alike but are processed somewhat differently than other alloy steel powders.

The code for indicating applications of various atmospheres is as follows:

Y—indicates that the materials can be given the indicated treatment with the indicated atmosphere most economically and with best metallurgical qualities.

*Y**—indicates that the particular class of atmosphere will yield good metallurgical results, but other atmospheres can be as effective, more economically.

*Y***—indicates that though these atmospheres are believed to be metallurgically superior, they are neither capable of producing better results on the most critical alloys, nor at as favorable cost as other atmospheres indicated with *Y*.

S—indicates that, depending upon quality desired, the indicated class of atmosphere may be used on some types of steel included in the column heading.

*S**—indicates an unfavorable economic condition weighs against a particular atmosphere, but that some materials of the type indicated are actually treated in that atmosphere.

N—indicates atmospheres which are never used for such treatments, though they might be so applied if cost factors were completely ignored.

***—Wherever a lower grade of a given atmosphere is suitable for a given treatment on a given material, all higher modifications are metallurgically satisfactory, though not economical.

TABLE III

Cross-Correlation of Control Atmospheres With Methods of Treatment and Materials Treated —Nonferrous Materials

Atmosphere	Annealing (Bright)					Solution Hardening [3]			Refining and/or Protecting Molten Alloys			Sintering Powdered Metals		Furnace Brazing			Drying Paints, Vitrified Enamels Baking Ceramics, Japaning, Ore Reduction, etc.
	Brass, Bronze	Cu[1]	Cu[2]	Copper-Nickel	Copper-Silver	BeCu	Al	Mg	Cu	Al	Mg	Cu	Brass	Cu	Brass	Ni	
GROUP I																	
1	..	S	S	..	..	..	S	Y	..	..	Yp	..	..	..	..	..	S
1A, c, r, d	S	S	Y	Y	S	S	Y	..	..	S	..	S	S	Y	Y	..	S
1B, d	Y	Y	..	..	Y	..	..	..	Y	Y	Yr	Y	Y	..	..	S	S
2	..	..	S	..	..	..	..	Y	..	..	Yp	..	..	..	..	..	S
2A, c, r, d	S	..	Y	Y	S	Y	Y	..	..	S	..	S	S	Y	Y	..	S
2B, d	Y	S	..	..	Y	..	..	..	S	..	Yr	Y	Y	..	..	S	Y
3	..	..	S*	S*	..	S	S*	Y*	..	..	..	S*	Y*	S*	S*	..	S*
3A, d	S*	..	Y*	..	..	..	..	..	..	..	Y*r	..	..	..	..	..	S*
4	..	..	Y*	S*	..	..	..	..	..	..	..	..	Y*	S*	S*	..	S*
4A, d	S*	..	..	..	..	..	..	..	..	..	S*r	..	..	..	..	..	S*
GROUP II																	
5	Yx	..	S*	S*	S*	S*	S*	Y*	..	S*	Y*p	Y*	S*	S*	Y*	Y	S*
6	..	..	S*	S*	..	..	S*	Y*	..	..	..	..	..	..	..	..	S*
7	S*	S*	S*	S*	S*	..	S*	S*	..	..	Y*p	..	..	..	..	..	S*
7A, d	Y*	Y*	Y*	Y*	Y*	S*	Y*	..	Y*	Y*	..	S*	Y*	Y*	Y*	S	S*
GROUP III																	
8	S*	Y*	Y*	Y*	..	..	Y*	S*	..	..	Y*p	..	..	..	..	..	S*
8A, d	Y*	..	..	..	Y*	S*	..	..	Y*	Y*	..	S*	Y*	Y*	Y*	S	S*
9	Yx	..	..	..	..	..	..	..	..	..	..	Y*	..	..	..	Y*	S*
9A, d	Yx	..	S*	..	..	..	..	..	..	..	..	..	S*	..	Y*	..	S*
10	..	S	S*	..	..	..	..	Y*	..	..	Y*p	..	..	..	..	..	S
10A, d	S*	S	Y*	..	..	..	..	..	..	..	..	..	S*	S*	Y*	..	S*
10B, d	S*	S	..	..	..	..	..	..	..	..	Y*r	Y*	S*	..	..	..	S*

Letter notations are same as used in table II. Also, *p* and *r* indicate which modifications are suitable for protection and refining, respectively.

Amine scrubbers are used to modify classes 1, 2 and 10 in order to insure freedom from H_2S and other sulfur products, as well as to remove CO_2 which is detrimental to certain materials, particularly brass.

[1] Commercial, nondeoxidized copper.

[2] Deoxidized copper.

[3] Indicates the general range of solution treated nonferrous alloys which usually are actually hardened in low temperature aging operations not in themselves calling for protective atmospheres. High temperature treatments requiring atmospheres are used preparatory to hardening (solution treating).

permit users of atmosphere generators to concentrate upon the performances and the economies of cost and operation of the various competitive units supplying essentially the same atmospheres.

Continued study of controlled atmospheres reveals that many contradictory reactions can take place. The theory of equilibrium has predominated the field of study. Incorrect understanding of the significance of equilibrium factors, coupled with a misunderstanding of neutrality with respect to a given atmosphere and its effect on carbon steel has given rise to innumerable conflicting statements and beliefs. It was the theory that as the ratio of air to fuel decreased, the ratios of $CO:CO_2$ and $H_2:H_2O$ increased and the resulting control gases became less and less active in contact with increasing carbon and alloy contents in steel. This, in general, led to the development of generators using less air and more fuel. It was an effort to create ratios of $CO:CO_2$ which would be nonreactive to the critical steels.

Class 1 atmospheres are still very widely used, becoming, when completely modified, a cheap source of commercial nitrogen. However, removal of all active constituents does not produce an atmosphere which is neutral to carbon steel. In fact, for various reasons, such atmospheres of nitrogen, whether produced from fuel, ammonia or other sources, are both decarburizing and oxidizing to steel. The oxidation results from the inability of nitrogen to neutralize the inevitable ingress of oxygen by leaks or diffusion through porous structures. This decarburization is due to lack of balancing carbon potential in the atmosphere. These deficiencies of class 1 atmospheres, though not all known or understood at the time, gave rise to the development of class 2 generating units.

The real advantages of class 2 atmospheres, in the various modifications which ultimately became available, have never been fully understood. The emphasis on wider and wider ratios of $CO:CO_2$ caused this atmosphere to be used widely for less critical treatments, some where class 1 gases had failed. Full evaluation of the potential value of partially combusted fuel gases has never been brought to light.

The $CO:CO_2$ ratio theories forced development of partial cracking units, for class 3 atmospheres, and in the search for even greater concentrations of CO and H_2 complete reactivation or cracking of hydrocarbon fuels was sought and achieved. However, even with these atmospheres, class 4 types, decarburization remained a problem which, coupled with the very high unit cost of such atmospheres and the intensified sooting problems they engender, plus hypercritical control difficulties, provided rather disappointing results. The four classes of atmosphere gases derived from gas combustion can be divided more or less arbitrarily according to the percentage of oxygen required for total combustion as follows: Class 1 uses from 90 to 100 pct; class 2, 50 to 90 pct; class 3, 10 to 30 pct and class 4, 0 to 10 pct. Overlapping and variation exist potentially (and actually) in all generators for each class, but in general the atmospheres fall into the classifications in compliance with the above guide.

The search for neutral atmospheres, together with the search for less expensive types of generating units, motivated the development of anhydrous ammonia dissociators and combustors. The erroneous belief

that an atmosphere totally free from either CO or CO_2 would be nonreactive to carbon steels gave great impetus to an adventure which, on the basis of economics, would never otherwise have come about. The high unit atmosphere cost of dissociated ammonia, though partially balanced by somewhat simpler generating equipment (when used as produced) in comparison to fuel gases purified to an equivalent freedom from moisture and CO_2, militates strongly against its use, particularly in view of the fact that it is not neutral as originally hoped and believed. The lower unit cost of partially or fully burned dissociated ammonia is not only negligible but is completely offset by the rapid increment of water vapor. As a source of nitrogen, completely burned ammonia which has been desiccated, is frequently used, but is not competitive with nitrogen generators using fuel gases as the means of removing oxygen from the nitrogen in the air.

Atmospheres such as class 8 and 9 (commercially pure N_2 and H_2, respectively); were, and to a limited extent still are, proposed as being neutral if "pure enough." Actually, no atmosphere can be neutral to carbon steel if it contains no potential of carbon sufficient to balance the "escape pressure" of the carbon in the steel.

The need for a balancing carbon pressure will be expounded further, but at this point it is well to state that because of the total lack of any balancing pressure, whether of carbon or other essential constituents, the idea of heat treating critical materials in a vacuum is unsound. A vacuum would be very decarburizing to nearly all grades of steel, the total depth of such carbon loss being a function of time at temperature. It is very frequently overlooked that all materials, whether liquid, solid or gaseous, have partial pressures which increase rapidly as the absolute temperature rises. This being so, the escape pressure of carbon in steel must necessarily be compensated for by a positive back pressure of carbon in the atmosphere if carbon loss is to be avoided.

None of the atmospheres in group III are either *neutral* or satisfactory for handling critical carbon steels. Of the three, class 10 is by far the most valuable and the most satisfactory in theory and practice. However, the exceedingly high concentration of CO makes deposition of soot and addition of carbon to the steel a very difficult control problem. This, coupled with the very low concentration of H_2 in conjunction with a proportionally high percent of both H_2O and CH_4 intensifies carburizing and etching problems on most sensitive materials. As the equilibrium of H_2:H_2O is governed by the ratio of H_2:H_2O, regardless of total concentration, an unfavorable reaction may occur when the H_2 is at a minimum. These deficiencies, in conjunction with high unit atmosphere cost and maintenance problems which are peculiar to carbon generators, tend to restrict the applicability of such gases. Too low a concentration of H_2 creates problems almost as difficult to control as total absence of it, or as with too low a concentration or absence of CO. For an ideal atmosphere a working concentrations of both H_2 and CO are desirable.

Atmospheres 8 and 9 are included merely because they are frequently used from tank sources but are not normally identified as being modifications of other atmospheres. Class 8 is pure N_2 which, as mentioned, is either class 1B,d, or class 7B,d. Lacking any carbon potential or ability to react with oxygen, it is highly unsatisfactory for commercial handling of high carbon, and, in many instances, due to inability to insure freedom from oxygen by combination therewith, is unsatisfactory for controlled annealing of low or medium carbon steels. Further, depending upon the method of generation, atomic nitrogen may be formed which will intensify the decarburizing attack by the formation of CN gas. Formation of nitrous oxides in electric catalytic dissociators is frequently encountered and acts to intensify the formation of oxide scale. Tank-procured commercial nitrogen is entirely too expensive for extensive application, even where the use of nitrogen is essential, as it is in many chemical and nonferrous operations.

Pure H_2 class 9 gas, has marked advantages in the heat treatment of high chromium alloys since it prevents the formation of selective chromium oxides from any available source of oxygen which result in discoloration of the work. The treatment of various grades of electrical steels, such as silicon steel laminations and numerous high nickel steels, is most satisfactorily done in hydrogen. For all practical purposes class 5 A,d, atmosphere is an economical source

TABLE IV

Tabulation of Cost Ranges of 10 Base Atmospheres and Their Modifications*

	RAW	MODIFICATIONS **				REMARKS
		A, c, r, d	B	A and B	C (a, B)	
GROUP I						
1	0.06-0.25	0.01-0.12	0.10-0.18	0.11-0.30	0.02-0.45	Group I atmosphere costs depend upon cost of raw gas, ratio of air to gas in generating raw atmosphere, and cost of fuels or electricity for cracking.
2	0.08-0.29	0.01-0.12	0.10-0.18	0.11-0.30	0.02-0.45	
3	0.15-1.50	0.01-0.12	0.10-0.18	0.11-0.30	0.02-0.45	
4	0.20-2.00	0.01-0.12	0.10-0.18	0.11-0.30	0.02-0.45	
GROUP II						
5	1.50-4.00	0.03-0.08	0.06-0.09	0.09-0.17	0.02-0.32	Group II atmosphere costs depend upon quantities of ammonia bought, tank lots or carload, cost of heat, and ratio NH_3 to air.
6	0.80-2.70	.....	.....	.....	0.02-0.18	
7	0.55-2.00	0.01-0.12	0.06-0.09	0.07-0.21	0.02-0.39	
GROUP III						
8	6.00-9.00	0.04-0.08	.....	.....	.....	This gas is as bought in tanks only.
9	8.00-12.00	0.04-0.08	.....	.....	.....	This gas is as bought in tanks only.
10	0.60-1.50	0.01-0.08	0.10-0.18	0.11-0.26	0.02-0.43	Base cost depends upon grade of charcoal and ratio of air to fuel in generator.

* Cost expressed in dollars per 1000 cu ft.
** Add each modification cost to base (raw) figures.

of hydrogen, the presence of nitrogen having practically no influence on its efficacy.

An effort to cross-correlate the various base atmospheres and their commercially available modifications with the materials and treatments possible and advisable in each, is presented in tables II and III. The tables illustrate not only the treatments which are most satisfactory, metallurgically speaking, but most economical for large scale operations. They endeavor to cover all normal ferrous and nonferrous treatments, and though a great deal of study has gone into them, quite probably they are far from complete. However, it is hoped that omissions which have occurred are treatments seldom used. The use of tables I, II, III and IV should materially assist in the understanding of the possible applications and relative costs of the various atmospheres. Table IV offers a condensed range of costs of all the listed atmospheres and their modifications. Much depends upon the actual base unit cost of the fuel gases used, the charcoal used or the volume cost of the ammonia, but insofar as base costs are concerned (except in extreme cases), the fuel gases in any stage of modification are the most economically advantageous.

In general the cost of each modification step remains essentially the same for any base gas when an equal degree of purity is reached. Therefore, the increase in unit atmosphere cost for all ten base gases through each phase of modification is assumed to be uniform throughout. This is not strictly true where excessive amounts of water are to be removed, or when excessive amounts of CO_2 are to be scrubbed out, but in arriving at any comparable degree of purity, the relative costs are so close as to have no effect on the general reliability of the figures.

In all instances a sufficient range of cost increase is given to cover different fuel costs, electric costs, water prices and amine recovery rates and similar variables which effect the ultimate unit atmosphere in each base atmosphere and for any degree of modification.

Within the group I gases, classes 1 and 2 have marked economic advantages over 3 and 4, in all stages of modification. When it is recognized, from tables II and III, that proper preparation of class 1 or 2 atmospheres will make them suitable for all processes except those few requiring hydrogen, it appears that one or the other of these base atmospheres may become the source of a more or less universal atmosphere. This is particularly possible in the case of class 2 atmospheres, as will be shown in a later issue.

In a subsequent issue the authors will continue with a discussion of the present-day concepts surrounding the use of controlled atmospheres.—Ed.

German Industrial Radiographic Inspection Standards

GERMAN wartime specifications for industrial radiographic inspection were generally more complete than those followed in the United States, according to a report on German use of x-ray equipment and radiographic standards for ship, aircraft, railroad, bridge building and other industries prepared by F.H.F. Kaiser for the U. S. Naval Technical Mission in Europe.

In shipbuilding, according to the report, radiographs of a certain proportion of all welded seams were examined by a German national x-ray organization before a vessel could be approved for service. An aircraft industry association also provided for inspection of all welded seams, castings, propeller blades and other critical parts.

The sensitivity of radiographs was judged by the clarity with which standard test cards showed up in the radiographs. These cards, which were placed behind the metal object being tested, contained seven wires of graded sizes and special lead spheres pressed in rubber. Cards containing wires of different diameters were specified for testing objects of various thicknesses.

Wartime radiographic development in Germany, according to the report, took a different turn from that in the United States. As for example, the Germans did not develop high voltage equipment of more than 300 kv, but on the other hand, hollow-anode, endgrounded x-ray tubes were commonly used in Germany.

Other devices noted in the report were the "Roentgenblitz, which permitted x-ray exposure of high intensity for periods of 10^{-6} to 10^{-7} sec.; the use of soft x-rays, such as chromium radiation, for ballistics research; a turntable installation for radiographing a number of welded tubes of identical shape and size, and a new type of stereo-fluoroscopic unit for medical work. The report includes official German specifications of x-ray and gamma ray inspection and a bibliography of recent German literature on x-ray technology.

FIG. 1—This mounting arrangement for the precision casting of tensile specimens enables the sprue to act as a feeder. The small wax caps attached to the ends of the wax patterns serve as a trap for any surface dirt or oxide.

Precision Casting

An investigation of the properties of cast aluminum bronze and beryllium copper resulting from the heat treatment of precision investment cast specimens is described herein. A novel feature of this research was the adaptation of the insulating properties of the investment by quenching while the alloy was still in the solid solution temperature range.

o o o

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SINCE the properties of aluminum bronze and beryllium copper make them attractive alloys for high-strength precision castings, an investigation was made of the properties resulting from the heat treatment of precision-cast tensile specimens. An important point of interest was the adaptation of the precision casting process to perform the solution treatment phase of the heat-treating cycle required for these alloys.

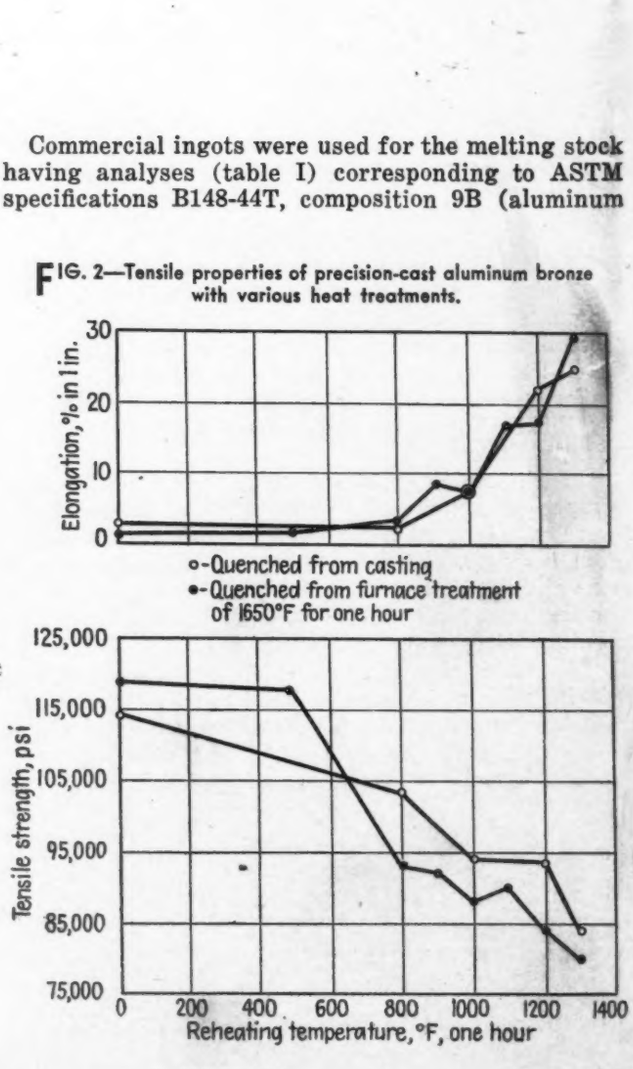
The incorporation of the first step of this heat treatment into the precision casting process is dependent on the possibility of quenching the casting while it is still in the solid solution temperature range. This possibility is enhanced by two factors. The first is the excellent insulating properties of the investment which causes a slow rate of cooling of the cast metal. The second factor is the peculiar property of the silica and plaster of paris type of investment to disintegrate very rapidly when plunged into water, provided the investment temperature is above 600° to 800°F. This rapid disintegration of the investment permits prompt quenching without the necessity of removing the casting from the investment before it is immersed in the quench tank.

Procedure

The wax patterns were so gated (fig. 1) as to enable the sprue to act as a feeder. Small wax caps were attached to the ends of the wax patterns in order to provide a trap for any surface dirt or oxide which might be swept to the end of the casting. The procedure for investing and burning out the flasks has already been described.[1]

Commercial ingots were used for the melting stock having analyses (table I) corresponding to ASTM specifications B148-44T, composition 9B (aluminum

FIG. 2—Tensile properties of precision-cast aluminum bronze with various heat treatments.



Heat-Treatable Copper-Base Alloys

bronze) and B120-41T (beryllium copper). These analyses were as follows:

Analysis of Ingots

	Aluminum Bronze, Pct	Beryllium Copper, Pct
Copper	88.48	97.06
Tin	0.03*	<0.01*
Lead	0.01*	<0.01*
Iron	0.99	0.05*
Nickel	0.06*	0.50
Antimony	<0.01*	<0.01*
Arsenic	<0.02*	<0.02*
Manganese	0.20	0.02*
Aluminum	9.76	0.04*
Silicon	<0.05*	<0.05*
Bismuth	<0.005*	<0.005*
Beryllium	.....	2.20

* Spectrographic analysis.

The alloys were melted by induction in a small clay-graphite crucible, each heat not exceeding 3 lb. No cover or flux was used. The centrifuge casting technique was the same as previously described[1] using a casting temperature of 1975°F, for both alloys. Investment temperature was standardized at 800°F.

[1] *S. Lipson, H. Markus, H. Rosenthal,* THE IRON AGE, *Nov.* 1, 1945, *pp.* 46-49.

Aluminum Bronze

The heat treatment of aluminum bronze has been compared to that of steel. Like austenite in steel, quenching of the high temperature beta phase of aluminum bronze does not prevent the formation of a martensitic structure which consists of transition phases intermediate between the original beta and the stable products of the eutectoidal reaction, alpha and delta.

The conventional heat treatment consists of quenching the alloy from a temperature in the order of 1650°F, and then reheating to a temperature of about 1000°F, followed by an air cool.

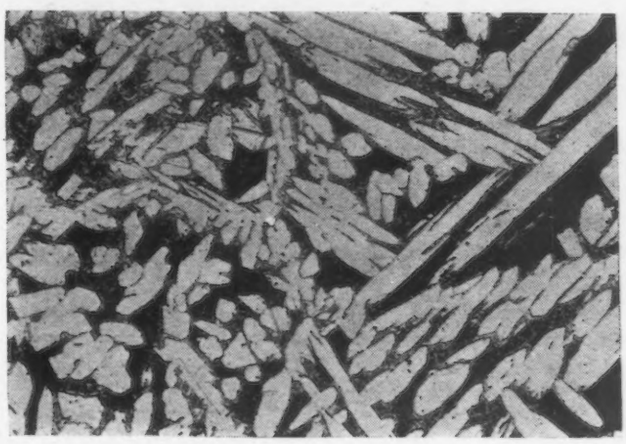
Two types of specimens were cast. In one, the alloy was cast and allowed to cool slowly in the investment. In the other, the alloy was cast and quenched as soon as the metal solidified. This period was found by experiment to be 3 min after the start of the casting operation. The slow-cooled specimens were given a furnace heat treatment of 1650°F, for 1 hr and quenched in water.

A series of reheating treatments was then applied to both types of specimens to determine the resulting tensile strength and elongation.

Referring to fig. 2, it is evident that substantially the same tensile strength and elongation are obtained from either of the samples. With reheating temperatures below 1000°F, the elongation values are fairly stable below the 10 pct level although the tensile strength values drop rapidly from about 115,000 psi to about 90,000 psi. With reheating temperatures between 1000°F and 1300°F, the elongation values rise rapidly to the 25 to 30 pct level, but the tensile strength values decline only moderately from about 90,000 psi to about 80,000 psi.

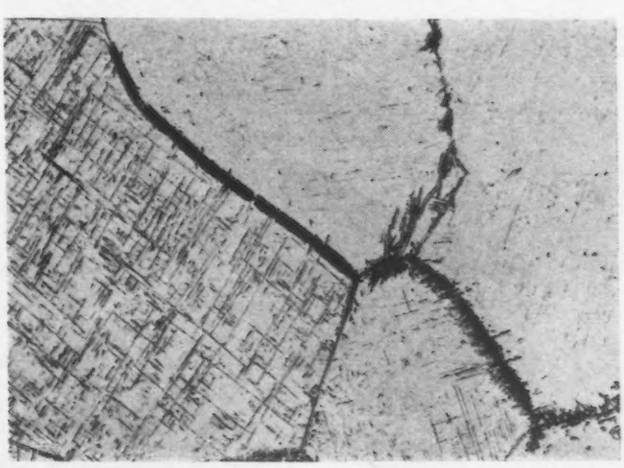
The microstructure of the alloy in the slow-cooled, as-cast condition is shown in the upper part of fig. 3. The light areas are the alpha constituent and the dark areas are decomposed beta.

The lower part of fig. 3 shows the structure of the

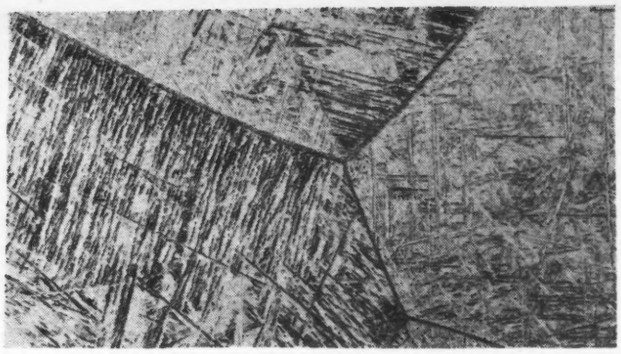


Slow Cooled

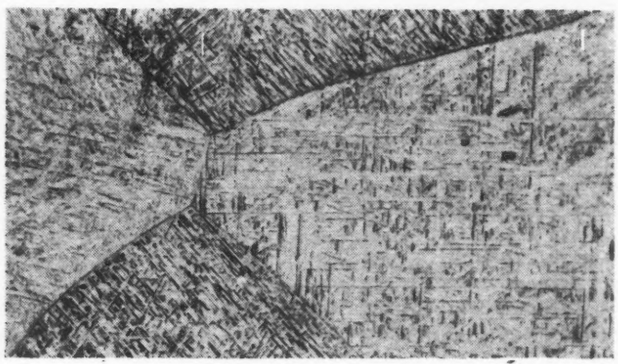
FIG. 3—In the upper micrograph can be seen the typical structure of aluminum bronze in the slow-cooled, as-cast condition. The light areas are the alpha constituent and the dark areas consist of decomposed beta. The lower micrograph shows the structure of the alloy quenched 3 min after the start of centrifuging. The martensitic-like structure is characteristic of the alloy after being quenched from the beta field. The dark material along the grain boundaries is probably a mixture of beta and decomposed beta made up of alpha and delta. Etched in NH_4OH and H_2O_2; at 75X.



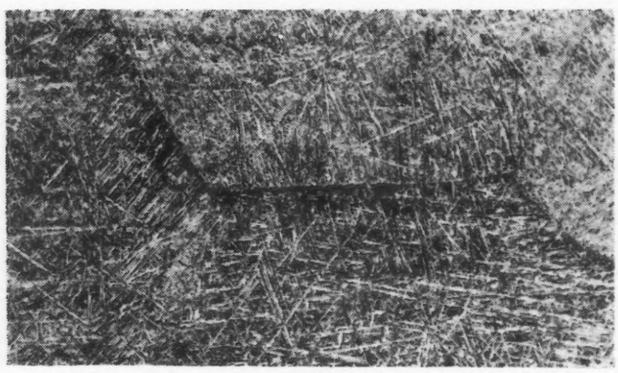
Quenched 3 Min After Casting



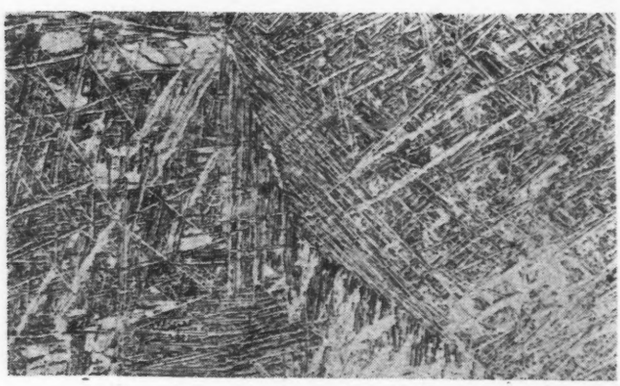
As Quenched



Reheated 800°F—One Hr



Reheated 1000°F—One Hr



Reheated 1200°F—One Hr

FIG. 4—This series of microstructures represents the effect of various reheating temperatures on the slow-cooled aluminimum bronze castings. It can be seen that reheating temperatures up to 1000°F do not appreciably alter the original structure. With reheating temperatures above 1000°F more of the white alpha phase becomes visible. Etched in NH_4OH and H_2O_2; at 75X.

alloy quenched 3 min after the beginning of centrifuging. The martensitic-like structure is characteristic of the alloy after being quenched from the beta field. The dark material along the grain boundaries is probably a mixture of beta and decomposed beta made up of alpha and delta.

The series of microstructures shown in fig. 4 represents the effect of the various reheating temperatures on the slow-cooled alloy subsequently heated to 1650°F, and quenched. Here again the predominant structure is of martensitic-like appearance. Reheating temperatures up to 1000°F do not appear to alter the original structure noticeably. With reheating temperatures above 1000°F, more of the white alpha material becomes visible.

In order to facilitate hardness measurements, separate specimens of ¼-in. square cross-section were cast. One of these castings was quenched 3 min after pouring while the other was allowed to cool slowly. The slow-cooled specimens were heated to 1650°F, for 1 hr and quenched. Figs. 5 and 6 show the hardness obtained by reheating both types of specimens.

These curves indicate that both the solution heat-treated and quenched specimens react in similar fashion to the various reheating temperatures and the various times at temperature. At 500°F, the hardness tends to increase slightly and, at 800°F, the hardness remains constant or decreases somewhat. With temperatures of 900°F and 1000°F, the initial drop in hardness is followed by a small increase which precedes the final slow decline in hardness values. Reheating temperatures of 1100°F and 1200°F cause a steep initial fall in hardness up to 1 hr at temperature. Between 1 and 3 hr at temperature, the hardness decreases gradually.

Beryllium Copper

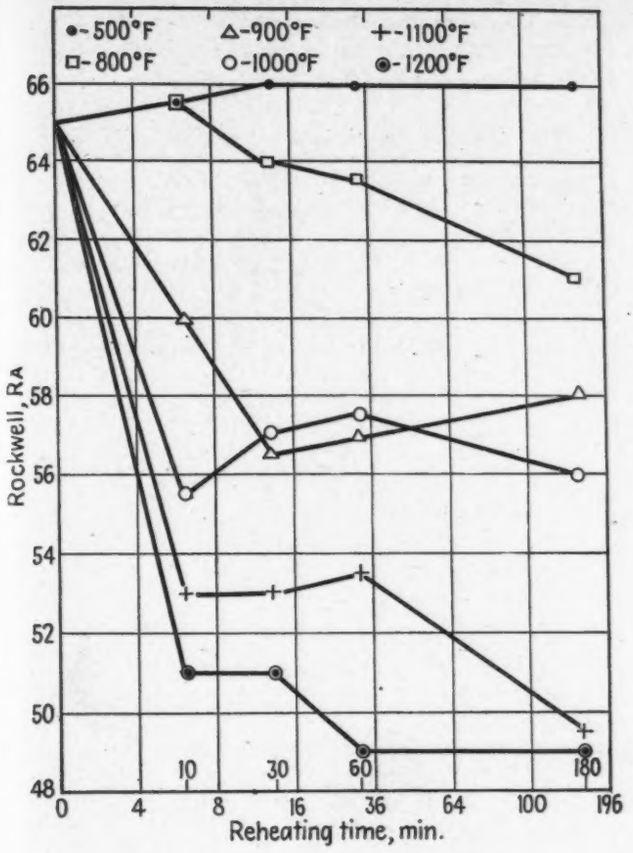
Beryllium copper is an age-hardenable alloy which in addition to copper contains approximately 2 pct beryllium and small amounts of nickel and iron. The nickel is thought to act as a grain refiner and the iron as an accelerator of the age-hardening process.

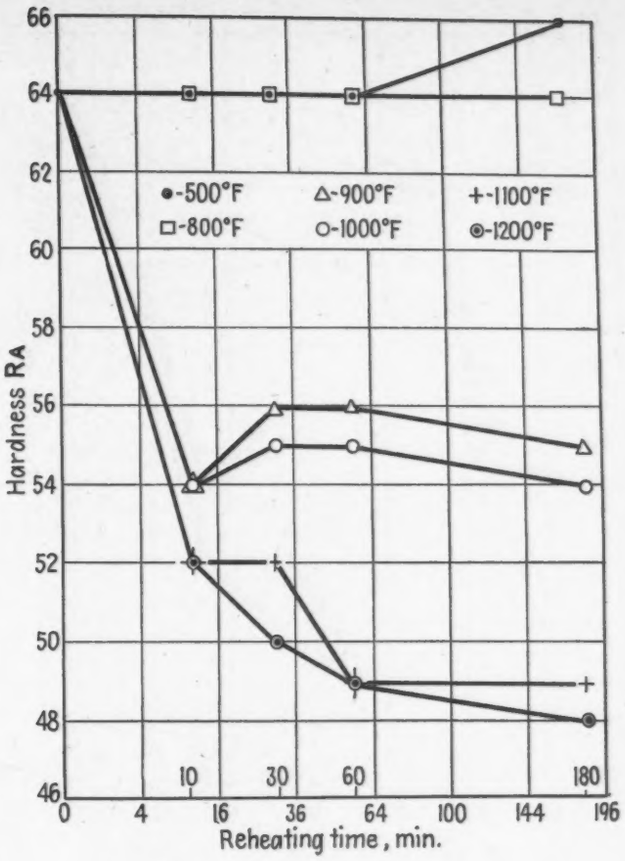
By quenching the alloy from a temperature in the alpha solid solution field, the beryllium is retained in solution with the copper. Subsequent low temperature heat treatment or aging causes the beryllium to precipitate as the gamma phase from the supersaturated alpha.

Most of the literature on this alloy pertains to the treatment of wrought beryllium copper sheet, strip and rod. However, Cone[2] has covered some important problems connected with the use of beryllium copper as a casting alloy. One of the chief difficulties is that beryllium acts as a strong reducing agent with a very great affinity for oxygen. Since beryllium is an expensive metal, care must be taken to prevent undue loss of the beryllium in the melting and casting processes.

In order to determine whether any serious amount of beryllium was being lost in the melting and casting operations, an analysis of two casts was made. The beryllium found in the ingots was 2.20 pct. The beryllium determined in the two casts was 2.17 pct and 2.39 pct. From this it appears that there is no appreciable loss of beryllium even though the metal was melted without the use of a flux cover or char-

[2] *E. F. Cone, "Beryllium-Copper Castings," Trans., AFA,* 1933, *pp.* 330-346.



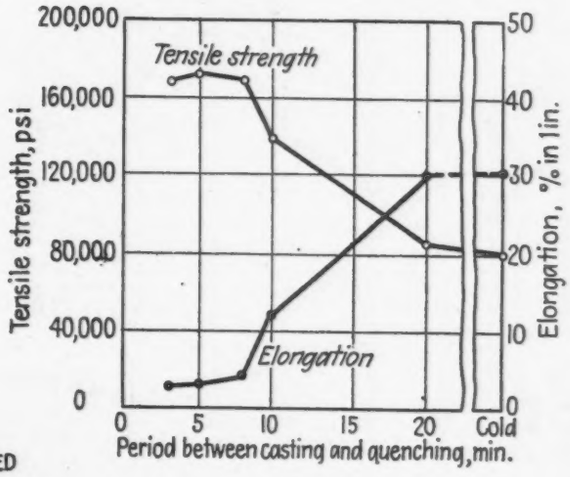


ABOVE

FIG. 5—Hardness of aluminum bronze cast specimens heated to 1650°F for 1 hr and quenched in brine. These castings were then reheated for various times at various temperatures.

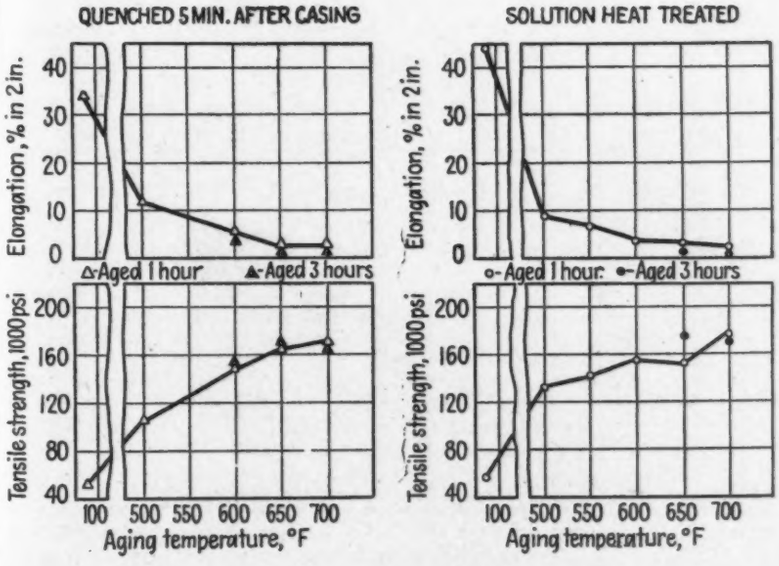
ABOVE RIGHT

FIG. 6—Hardness of cast aluminum bronze quenched 3 min after casting and reheated for various times and temperatures. From the curves here and in fig. 5, it can be seen that both the solution heat-treated and quenched specimens react in similar fashion to the various reheating temperatures and times at temperature.



ABOVE

FIG. 7—Effect of various prequench intervals on the tensile properties of precision cast beryllium copper.


QUENCHED 5 MIN. AFTER CASING
SOLUTION HEAT TREATED
Elongation, % in 2in.
Tensile strength, 1000 psi
△-Aged 1 hour ▲-Aged 3 hours
○-Aged 1 hour ●-Aged 3 hours
Aging temperature, °F

LEFT

FIG. 8—Final properties of aged beryllium copper with two types of solution heat treatment; the first (at left) quenching 5 min after pouring and the second (right) heating specimens for 3 hr at 1450°F followed by a water quench.

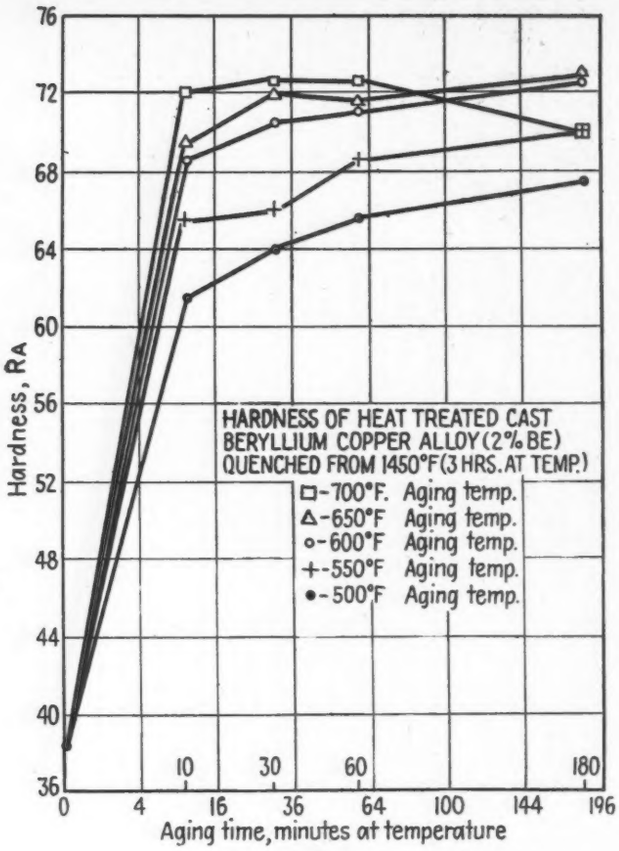

HARDNESS OF HEAT TREATED CAST BERYLLIUM COPPER ALLOY (2% BE) QUENCHED FROM 1450°F (3 HRS. AT TEMP.)
□-700°F. Aging temp.
△-650°F Aging temp.
o-600°F Aging temp.
+-550°F Aging temp.
•-500°F Aging temp.
Hardness, RA
Aging time, minutes at temperature

FIG. 9—Hardness curves of cast beryllium copper heated at 1450°F for 3 hr and quenched.

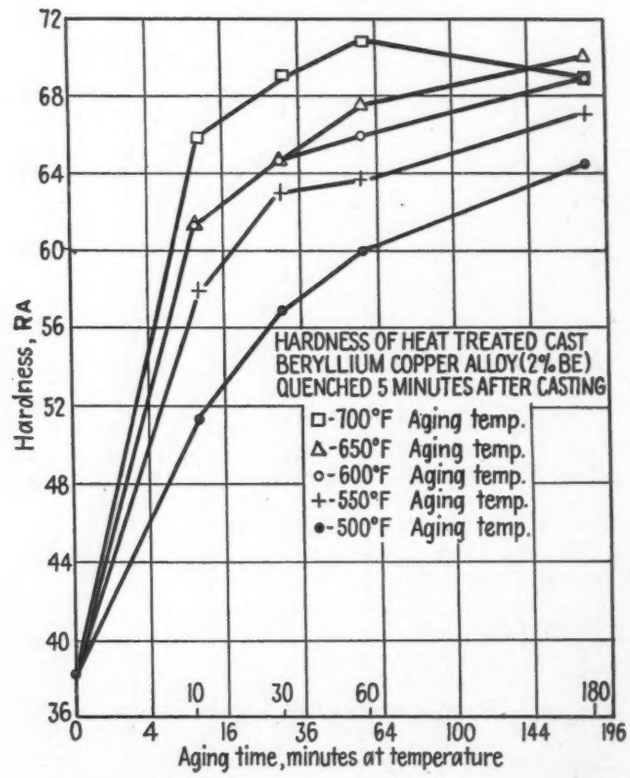

HARDNESS OF HEAT TREATED CAST BERYLLIUM COPPER ALLOY (2% BE) QUENCHED 5 MINUTES AFTER CASTING
□-700°F Aging temp.
△-650°F Aging temp.
o-600°F Aging temp.
+-550°F Aging temp.
•-500°F Aging temp.
Hardness, RA
Aging time, minutes at temperature

FIG. 10—Hardness curves for beryllium copper castings quenched 5 min after pouring. It is apparent that the solution heat-treated samples of fig. 9 harden more rapidly than the samples shown here. In addition, peak values of the former specimens are somewhat higher than the values for the flask-quenched samples.

coal. The reason for this retention of beryllium may be explained by the rapid melting achieved by induction heating.

Short Prequench Interval v. Slow Cooling

The effect of quenching the alloy from the flask is shown in fig. 7. The treatment consisted of quenching the entire flask in water after the specified interval from the pour followed by an aging treatment of 700°F for 1 hr. With 3, 5 and 8 min prequench intervals, the tensile strength and elongation values do not vary markedly although slightly higher tensile strength was obtained with the 5-min interval. With a 10-min interval, the tensile strength drops rapidly with a corresponding increase in elongation. The 20-min interval carries this trend almost as far as can be reached since slow cooling in the flask yields substantially the same results.

Fig. 8 shows the final properties of the aged beryllium copper with the two types of solution heat treatment: (1) Solution heat treatment accomplished by quenching the flask 5 min after the pour, and (2) solution heat treatment by the conventional heating of specimens for 3 hr at 1450°F, followed by a water quench. The general shape and position of both sets of curves are in good agreement although the maximum attainable tensile strength is slightly higher for the specimens that were solution heat treated in a salt pot.

Referring to fig. 8, both sets of curves show that overaging occurs at 700°F, with the 3-hr treatment. The peak tensile values obtained in the 600° to 700°F aging range are in good agreement with the properties associated with wrought beryllium copper. ASTM requirements listed under B120-41T specify that beryllium copper alloy rods and bars in the solution treated and precipitation hardened condition should have a minimum tensile strength of 150,000 psi and 3 pct elongation in 2 in. Cone's highest values for a sand-cast alloy (2.19 pct beryllium) in the solution treated and precipitation hardened condition are 116,600 psi tensile strength and 1 pct elongation in 2 in.

The hardness curves shown in figs. 9 and 10 were obtained with specimens cast in the manner described earlier. Judging by the response to aging for various intervals, it is apparent that the solution heat-treated samples harden more rapidly than the samples which were solution treated by quenching 5 min after casting. In addition the peak values for the solution-treated samples are somewhat higher than the values for the flask-quenched samples. Here

UPPER RIGHT

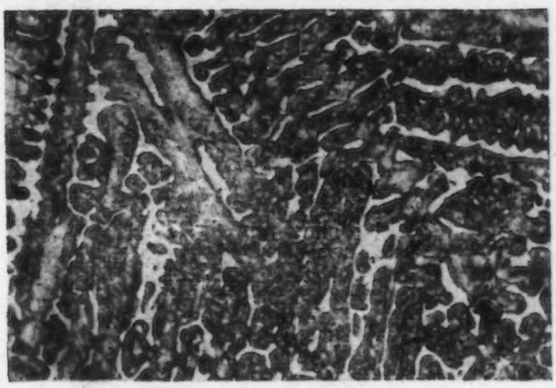
FIG. 11—The six micrographs here correspond to the specimens whose tensile strengths are shown in fig. 7. In the specimen quenched 3 min after casting, the primary dendrite arms are alpha constituent rich in copper while the interdendritic spaces consist of the beryllium-rich beta constituent. By aging this structure at 700°F for 1 hr, a darkening of the alpha is obtained. This darkening is attributed to the precipitation of the beryllium-rich gamma phase in submicroscopic particles. In the 10 and 20-min quenched and aged specimens eutectoidal decomposition of beta into alpha and gamma phases occurs. Etched in $CuSO_4$ and NH_4OH; at 75X.

RIGHT

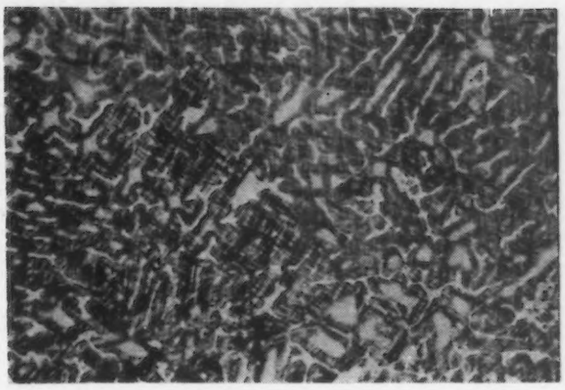
FIG. 12—Microstructures of precision cast beryllium copper, solution treated at 1450°F for 3 hr, quenched in water and then aged at various times and temperatures.

3 Min Quench—As Cast

3 Min Quench—Aged

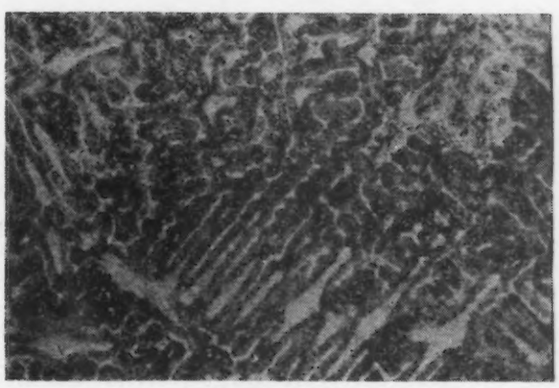


5 Min Quench—Aged



8 Min Quench—Aged

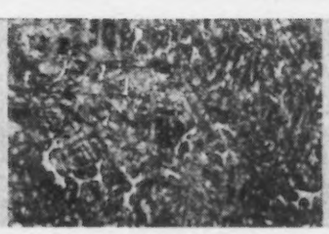
10 Min Quench—Aged



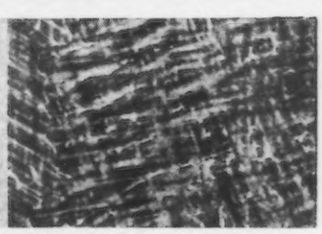
20 Min Quench—Aged

500°F—10 Min

600°F—10 Min



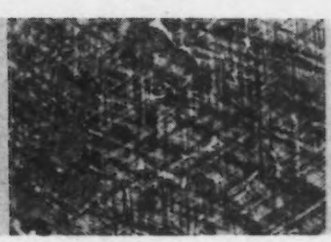
650°F—10 Min



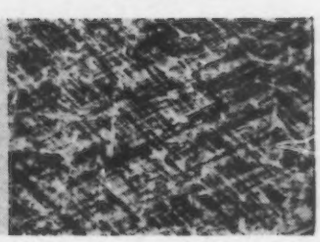
700°F—10 Min

500°F—3 Hrs

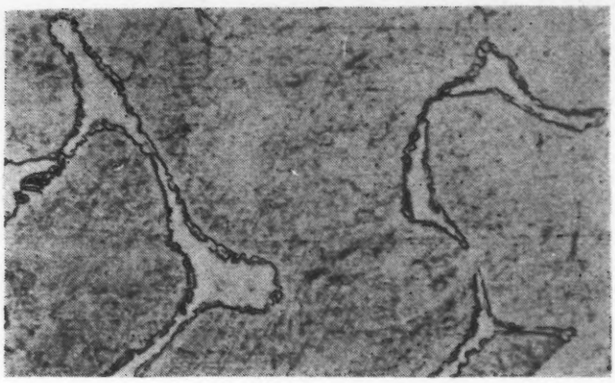
600°F—3 Hrs



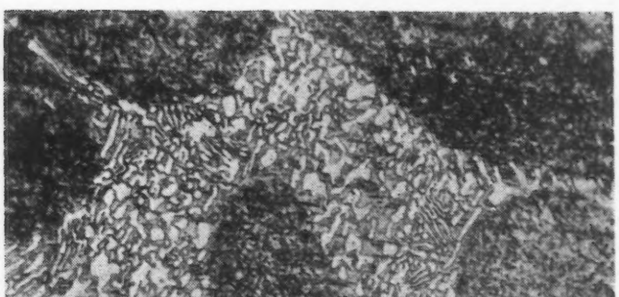
650°F—3 Hrs



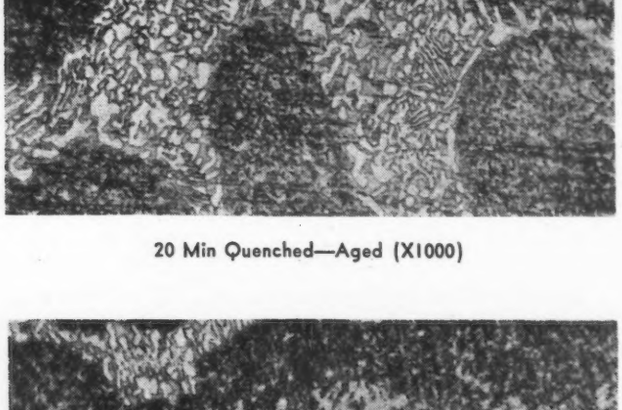
700°F—3 Hrs



10 Min Quenched—Aged (X500)



20 Min Quenched—Aged (X1000)



Slow Cooled (X1000)

FIG. 13—These micrographs at a higher magnification than those illustrated in fig. 11 show more clearly the eutectoidal decomposition of beta into the alpha and gamma phases. This decomposition which begins at the 10-min quenched specimen (top) is completed in the 20-min specimen (center), a phenomenon similar to that occurring in the slow-cooled specimen shown at the bottom. Etch $CuSO_4$ + NH_4OH.

again, the first signs of overaging are seen with the 3-hr interval at 700°F.

The series of microstructures shown in fig. 11 correspond to the specimens whose tensile properties are shown in fig. 7.

Referring to fig. 11, a cored dendritic structure may be seen in the specimen quenched 3 min after casting. The interdendritic spaces are occupied by the light-colored beta constituent which is rich in beryllium. The alpha constituent consists of primary dendrite arms rich in copper, but supersaturated with respect to beryllium because of the quench immediately after solidification. By aging this structure at 700°F for 1 hr, a darkening effect in the alpha is obtained as shown in the adjoining micrograph. This darkening is attributed to the precipitation of the beryllium-rich gamma phase in submicroscopic particles during the 700°F aging treatment.

Precipitation of the gamma phase in the 8-min quenched and aged specimen is characterized by a streaking effect which is prominent in the solution heated and aged specimens of fig. 12.

The microstructure of the 10 and 20-min quenched and aged specimen introduces another type of reaction which is the eutectoidal decomposition of beta into alpha and gamma. Referring to the high magnification micrographs of fig. 13, it is apparent that the 10-min quenched and aged specimen has just begun to undergo this decomposition. Along the edges of the beta islands there can be seen the eutectoidal reaction products. The beta islands are completely decomposed in the 20-min quenched and aged specimen which is similar to the fully slow-cooled specimen also shown in fig. 13.

From the preceding evidence, certain deductions may be made as to the temperatures of the casts at the time of quenching. The 10-min period allowed the cast to cool to the vicinity of the eutectoid reaction line which is at 1075°F. Therefore, the temperature at the end of the 3 and 8-min intervals was above 1075°F and for the 20-min interval was below 1075°F.

Although the alpha does not show much darkening in the 10-min quenched and aged specimen, a considerable amount of hardening must still have taken place to account for the tensile properties shown in fig. 7. This same figure indicates that the 20-min quenched and aged specimen gained little if any by the quenching and aging treatment since the same properties were obtained by slow cooling without quenching.

Fig. 13 shows that the primary alpha has undergone advanced decomposition in both the 20-min quenched and aged, and the slow-cooled specimens. The decomposition is not associated with the aging reaction at 700°F but with the cooling from the solidification. Most of the excess beryllium has been rejected from solution in the alpha to form the small particles of gamma which are in greatest concentration around the beta islands in fringe-like clusters.

Conclusions

(1) By quenching the castings immediately after solidification and then applying a low temperature reheating treatment, the hardness and tensile properties of aluminum bronze and beryllium copper become substantially equivalent to specimens given the conventional heat treatment.

(2) The properties attainable by this special quenching technique meet ASTM requirements for cast material in the case of aluminum bronze and for wrought material in the case of beryllium copper.

Acknowledgment

For permission to publish this article, the authors are indebted to Capt. S. M. Lawrence, officer in charge of the Frankford Arsenal Laboratory; C. C. Fawcett, acting director of the Frankford Arsenal Laboratory, and the War Dept. Office, Chief of Ordnance.

X-Ray Diffraction as an Analytical Tool

The use of X-ray diffraction as an analytical tool has been integrated into the entire analytical section of the Armour Research Foundation. What can be accomplished in the way of chemical determinations through the application of X rays is herein discussed.

By DAVID GOODMAN
General Electric X-Ray Corp., Chicago

THE experience of many company and independent laboratories demonstrates that X-ray diffraction is an indispensable weapon in research. In fact, detailed information as to its applications can rarely be obtained because diffraction plays such a vital developmental role in industry's programs for the future.

However, the activities of one independent laboratory—Armour Research Foundation, a division of the Illinois Institute of Technology, Chicago—can be revealed to some extent without affecting privacy agreements.

The facilities of the X-ray diffraction, or crystallographic, laboratory comprise a major component of the foundation's analytical section, since many problems originating in other sections require X-ray determination to complete the analysis. In addition, it frequently happens that the X-ray approach is the only one that can be applied. The majority of problems studied by the X-ray laboratory are those involving chemical compound identification, although some very important problems in the metal field have also been solved.

Of particular significance is the comprehensive attack which can be made upon a problem with a setup of this type. From fig. 1 it can be seen that, altogether, five different analytical methods work cooperatively—diffraction, spectroscopy, microscopy, analytical chemistry and physical testing—to achieve maximum effectiveness. To attempt identification by X ray alone might, in some cases, prove a difficult job, especially if many compounds are present in the mixture and a time limit is specified. It is apparent that the work of the X ray and microscopy laboratories can be eased if the spectroscopy and chemistry laboratories can quickly show the presence of a few elements and ions.

Additional articles on the subject of radiography appeared in the following issues of THE IRON AGE:

"Radiographic and Fluoroscopic Interpretation of Casting Irregularities," May 2, 1946, p. 46.

"High Voltage Radiography," Feb. 21, 1946, p. 58.

"X-Ray Standards for Purchasing Castings," Nov. 22, 1945, p. 62.

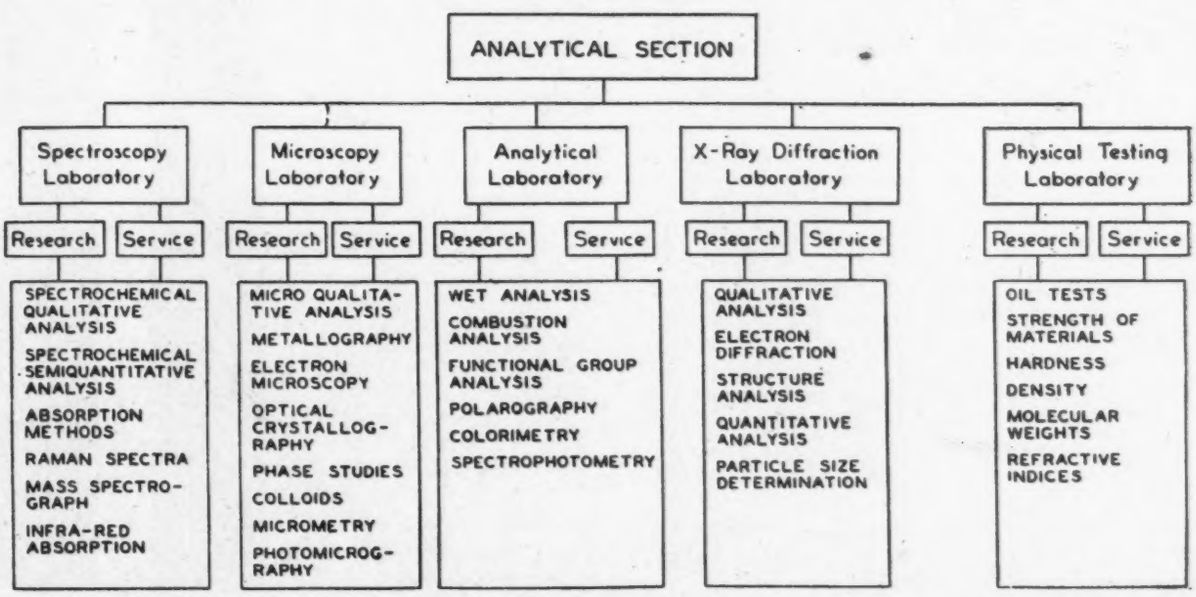
"Two Million Volt X-Ray Tube for Thick Steel Sections," Nov. 2, 1945, p. 62.

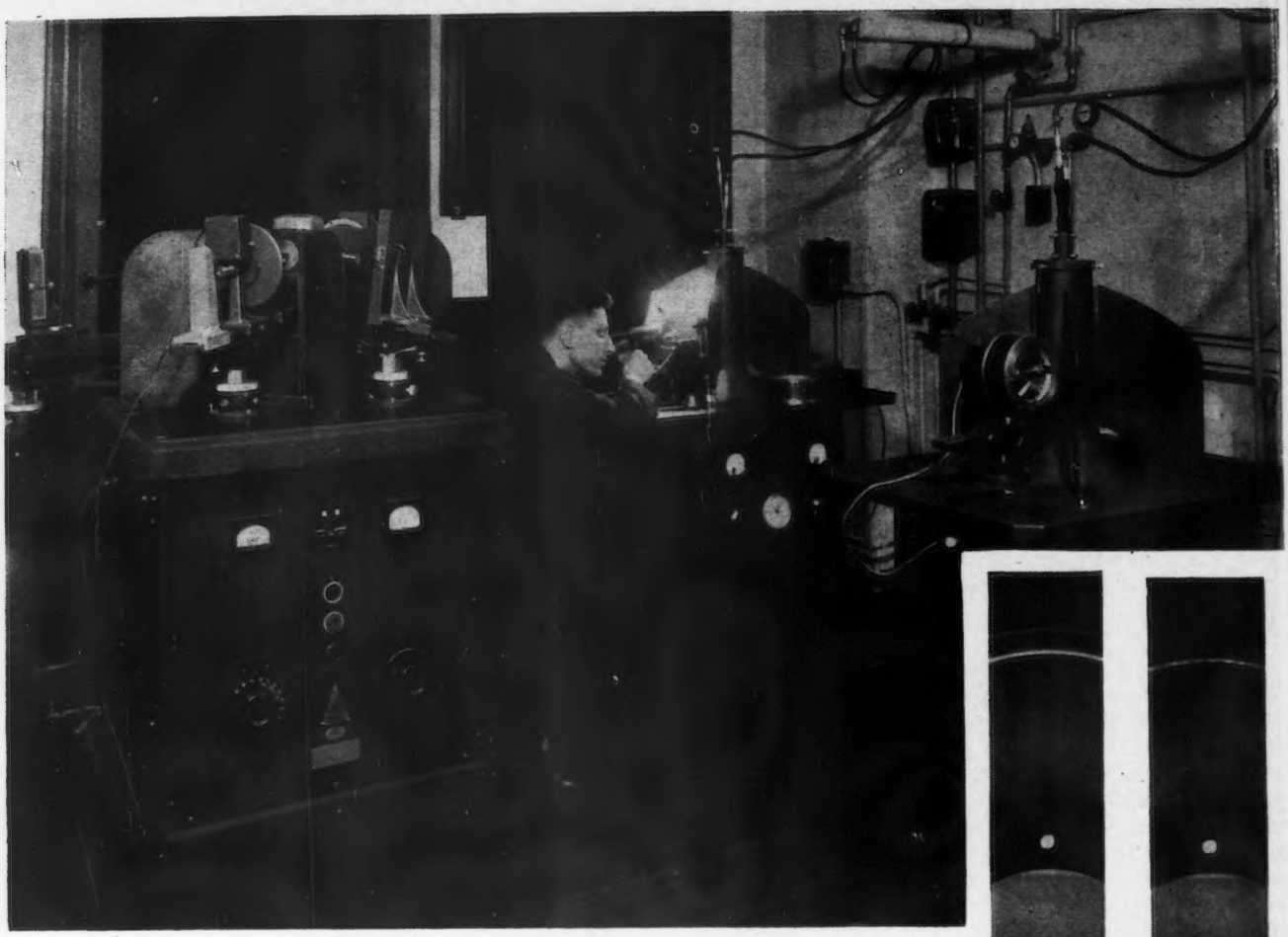
"Accurate Inspection of Magnesium Alloy Castings," July 13, 1945, p. 55.

"Radiographing Magnesium Alloy Test Bars," July 20, 1945, p. 74.

X-ray procedures are simple, and sufficient information giving the theory behind the procedures are available in a number of textbooks. The fundamental expression is Braggs' law, $n\lambda = 2d \sin \theta$. The wavelength is known, and may be measured from the photographic film. The determination of d, the atomic spacings for the various sets of planes, together with intensity estimates of the reflections, suffice in general to finger-

FIG. 1—The analytical section of the Armour Research Foundation diagrammatically outlined to show the close cooperation among the various divisions.





print the crystalline compound. It is clear that other fingerprinting methods, such as density, refractive index, melting point, or other physical constants may be effectively utilized.

It is very common for several compounds to be present in a mixture. The many lines present may require as accurate a determination of d values as possible along with reasonably accurate intensity values. To that end, the X-ray camera for powder work should be well made, and the film capable of accurate placement within the camera. A system of fiducial markings to enable accurate determinations of the camera constants, a well-centered collimating system, reasonable control of film developing characteristics, and a method for determining intensities are required.

Generally, samples are received in powdered form, but single crystals are not uncommon, and samples may appear in the form of sheets, deposits on sheets, large slabs, etc. Single crystals may be mounted on a crystal goniometer, and the same instrument may hold thin sheets and other samples not conveniently held by the powder camera. If the samples are not too large, the powder cameras can effectively take care of a large variety of materials. Special holders and back reflection cameras are used for problems involving this technique.

Single crystals can conveniently be oriented for study by X rays if prominent faces are present. If no faces are present, optical studies may aid in orienting the crystal. Frequently, unoriented crystals have been indexed.

The choice of wavelength and size of sample is determined by the nature of the problem whenever these two factors have to be taken into account.

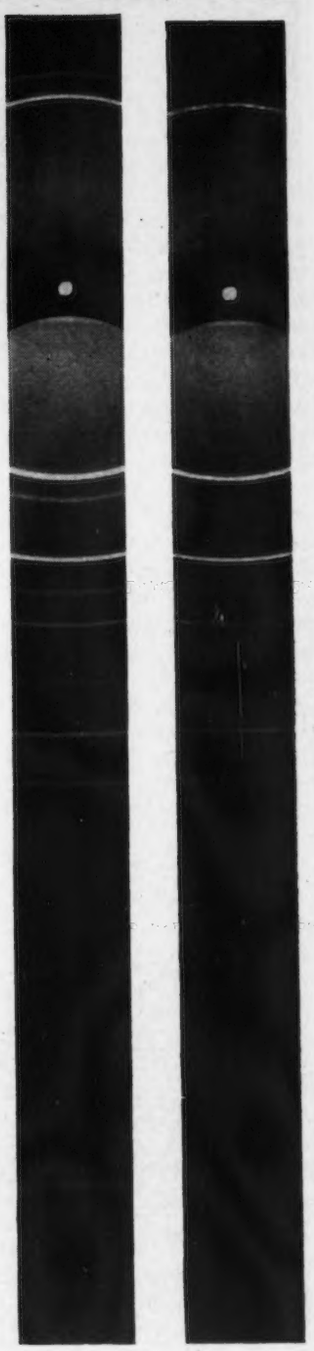
ABOVE

FIG. 2—View of the X-ray diffraction laboratory at Armour Research Foundation, Chicago.

o o o

RIGHT

FIG. 3—X-ray diffraction pattern of salt containing 72.92 pct KCl (left) compared with the pattern made by a salt containing 96.12 pct KCl (right).



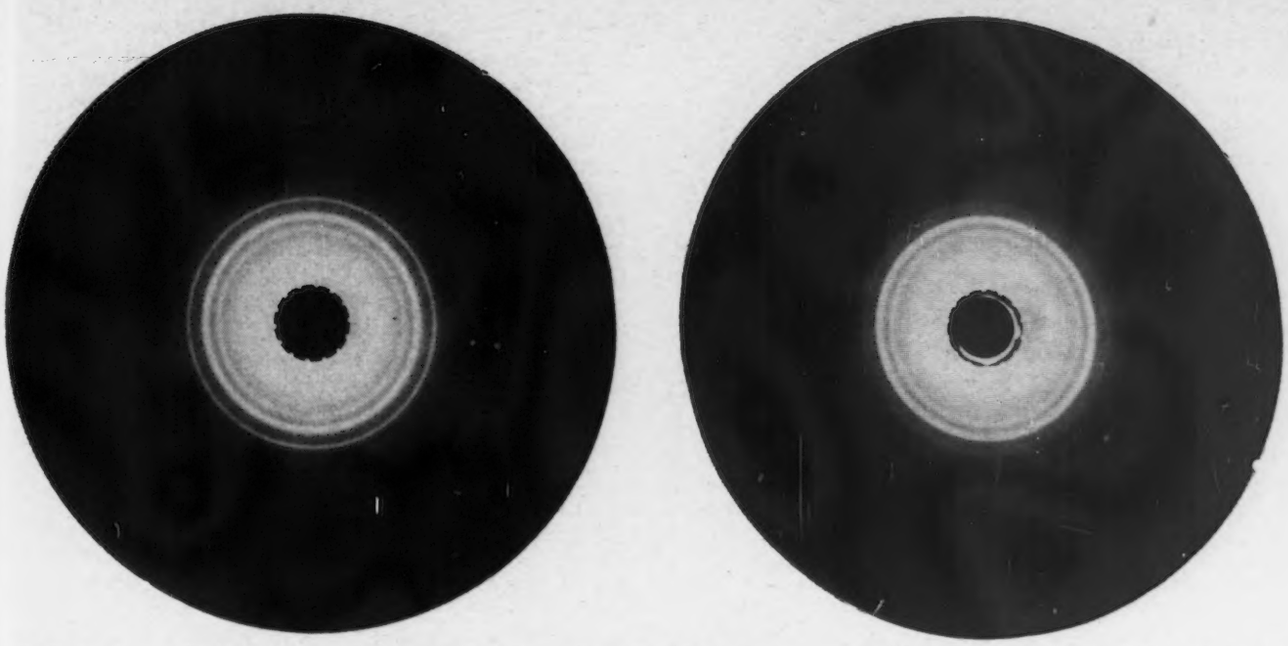


FIG. 4—X-ray diffraction pattern of cold-worked stainless steel. Outer dot indicates austenite line; inner dot, ferrite. The pattern on the left was made by a 20 pct reduced stainless steel while on the right is the pattern made by an 80 pct reduced steel. The increase in ferrite and greater reduction should be noted in the 80 pct specimen.

Once the atomic spacings have been measured and the intensities determined, the compounds are identified by the Hanawalt listings of compounds, provided, of course, that the particular compound is listed. The Strukturbericht, tables, and texts are available for reference and calculation.

Another role played by the X-ray laboratory, although not one of strict identifications of compounds, falls in the realm of analysis and analytical procedure. This role has been in the following-through of chemical reactions and syntheses. For instance, in one case, a series of physical procedures, along with slightly varying chemical changes, were applied in a particular developmental problem. X-ray studies were constantly made to detect any slight changes which could not be or were not easily detected by chemical methods in the various stages of development. Such data as the particular structure, the extent of solid solution, particle size, and the like may be noted. This type of study has been applied in a number of problems, and although it may be that an explanation may not be given of what has been observed, at least another tool is available for detecting a change that has occurred.

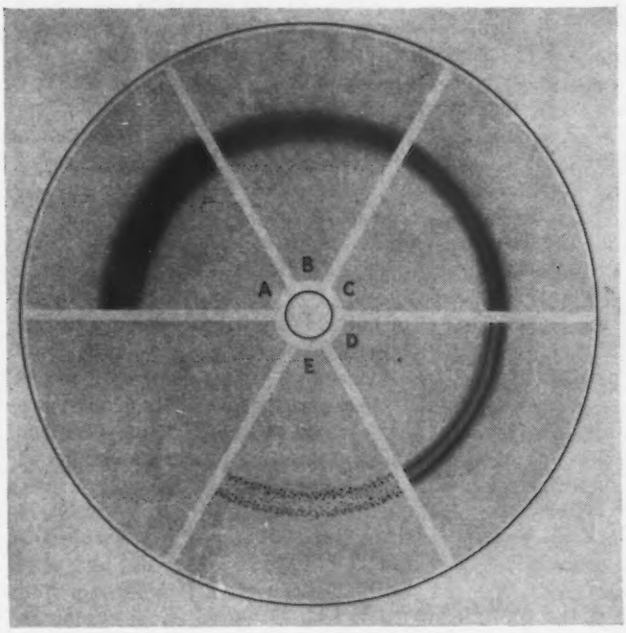
X-ray Studies of the Reaction of Solids

A few samples of some of the analytical work may be given here. One of the most important uses of X-ray diffraction is the study of chemical reactions, especially in the solid state. An example of this is the reaction between lead oxide and silica at temperatures well below the melting point of either constituent to give lead silicate. X-ray diffraction at the start of the reaction shows line patterns characteristic of the two phases, lead oxide and silica. As the reaction proceeds samples as small as 1 mg are removed and analyzed by X rays. The pattern for lead silicate becomes apparent and becomes steadily stronger in intensity as the reaction progresses. The reaction is finished when the patterns for lead oxide and silica have completely disappeared leaving a pattern characteristic of pure lead silicate. The progress of any reaction, organic or inorganic, may be followed in the same general way provided, of course, that the products are crystalline. Since no separations except perhaps filtering and drying are necessary, the X-ray methods of analysis often save considerable time.

In a particular problem, the nature of the solid phases present in various KCl—NaCl mixtures was studied. These samples have been formed by fusion. NaCl and KCl do not mix in all proportions, but form a series of double salts. These double salts are stable at the temperature of formation, but unstable at ordinary temperatures.

Upon measuring the refractive index of each sample, it appeared that the fused samples were homo-

FIG. 5—Composite drawing illustrating typical X-ray diffraction patterns for steel in various conditions: A—as hardened; B—under-tempered; C—optimum temper; D—overtempered, and E—annealed.



geneous and had indices corresponding to those predictable for solid solutions. Data on a few of the samples illustrate the problem.

Composition Pct KCl	Refractive Index Observed	Calculated
96.12	1.491	1.492
79.92	1.502	1.501

However, X-ray patterns obtained from the various samples showed the presence of separate KCl and NaCl diffraction lines, indicating that the mixture was a purely physical one of separate components. The apparent homogeneous character of the fused salts was explained on the basis of a particle size. Subsequent microscopic examination with very high resolution showed the components to have their true index values. X-ray photographs of the two samples are shown in figs. 2 and 3.

In another case, the ratio of the volume of ferrite to the volume of austenite in an alloy had to be estimated. The particle sizes were very small, leaving no method other than the X-ray method.

The X-ray procedure turned out to be reasonably simple; by measuring the intensity of scattering of particular planes, and with a knowledge of the constants of the ferrite and austenite structures, it was possible to measure the ferrite to austenite ratio with sufficient accuracy for the purpose.

The samples were in the form of cold-worked stainless steel materials which had suffered reductions of different percentages. The increase in ferrite with the greater reduction may be seen in figs. 4, 5 and 6. The outer dots indicate austenite lines and the inner dots the ferrite lines.

Among a number of fundamental studies being made by the X-ray laboratory is a theoretical consideration of the backgrounds of X-ray patterns of cold-worked metals.[1] A general theory associating distortion with the intensity of the X-ray background has been studied aud experimental work is contemplated in an attempt to use this theory in connection with the mechanism of plastic flow.

Another problem of a fundamental nature is being studied. In structure determinations, the problem is normally quite difficult because the structure factors are not always completely known. The experimental work now being conducted is an attempt to determine whether two simultaneous reflections show an intensity dependence upon each other. It is believed that this will shed some light on the absolute evaluation of the structure factors.

[1] *H. Ekstein, "Disorder Scattering of X-rays by Local Distortions," Phys. Rev. 68,* 120, 1945.

Effects of Moisture in Electrode Coatings

CONSIDERABLE work has been done concerning the effects of moisture in coatings of arc-welding electrodes, and according to J. B. Arthur, Testing Engineer, California Shipbuilding Corp., numerous and conflicting conclusions have been reached. It was felt at Calship, however, that in most cases the conclusions and recommendations were questionable, since the facts in some cases were circumstantial, and in other cases were confused to the extent that other variables were involved.

In order to clarify the situation in regard to electrode performance efficiency, and to determine the effect of moisture content in the coating upon this efficiency, some 7000 tests were made under carefully controlled conditions, using AWS class 6000 electrodes.

Moisture can probably occur in a coating in five different ways: (1) On the outside of the coating (adsorbed); (2) in the coating, but not chemically combined (absorbed); (3) in the coating, but chemically combined; (4) between the coating and the core wire, and (5) as a combinaton of any part or all of the above ways.

Since the interest lay only in that type of moisture which occurs during storage or handling, all tests were conducted with electrodes in moisture equilibrium, and conclusions are based on the fact that changes in moisture content were due only to changes in adsorbed or absorbed moisture. Chemical moisture was treated as a constant in all cases, and the error introduced by this consideration is insignificant from the standpoint of the data obtained.

After several thousand tests had been completed, and the results analyzed, the conclusion was reached that with AWS E6010 electrodes the Si and Mn content decreases with an increase in moisture, and that the number of fish eyes decreases as the moisture increases. The ductility increases as moisture increases with a consequent decrease in ultimate strength and yield point. Moisture increases penetration, using the same machine settings in the one case v. the other. The arc changes from a harsh arc or jet type to a spray type as moisture increases, and there is no radical effect on usability, weldability, or electrode efficiency. With the AWS E6012 electrodes the results are very similar, except that they are not so pronounced, while with the AWS E6020 electrode moisture has no direct effect on performance.

It would appear that too dry an electrode is not as satisfactory as one with a medium moisture content, and probably one of the most critical conditions in any electrode is a poor bond between the coating and the core wire. The usability under this conditon is extremely poor, as also is the weldability, and the chances of obtaining uniform welding quality is remote. The bond can be destroyed by severe cycles of drying and wetting, or can be broken by mechanical action. Therefore, bending electrodes in the stinger is not desirable, nor is the condition of storage leading to this action satisfactory.

Electrodes as receved from the manufacturer ordinarily do not have a large moisture content, but leaching will occur under excessive prolonged exposure of the electrode. This is not desirable since the coating is no longer stabilized and will produce erratic results. It would appear, therefore, that the complete moisture story is told when the electrode hits the box at the end of the manufacturing line, and that storage under average weatherproof protection without any further conditioning is satisfactory. As a matter of fact, it would appear that conditioning is harmful at times, and reasonable storage conditions are advocated.

Plating Auto Hardware

Production plating of automobile hardware in a fully conveyorized setup in a Ternstedt plant of General Motors Corp. is described herein. Racking procedure, solutions and current density for copper cyanide strikes, bright nickel plate, bright copper and chromium plate and various rinses are discussed in detail.

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By HERBERT CHASE

o o o

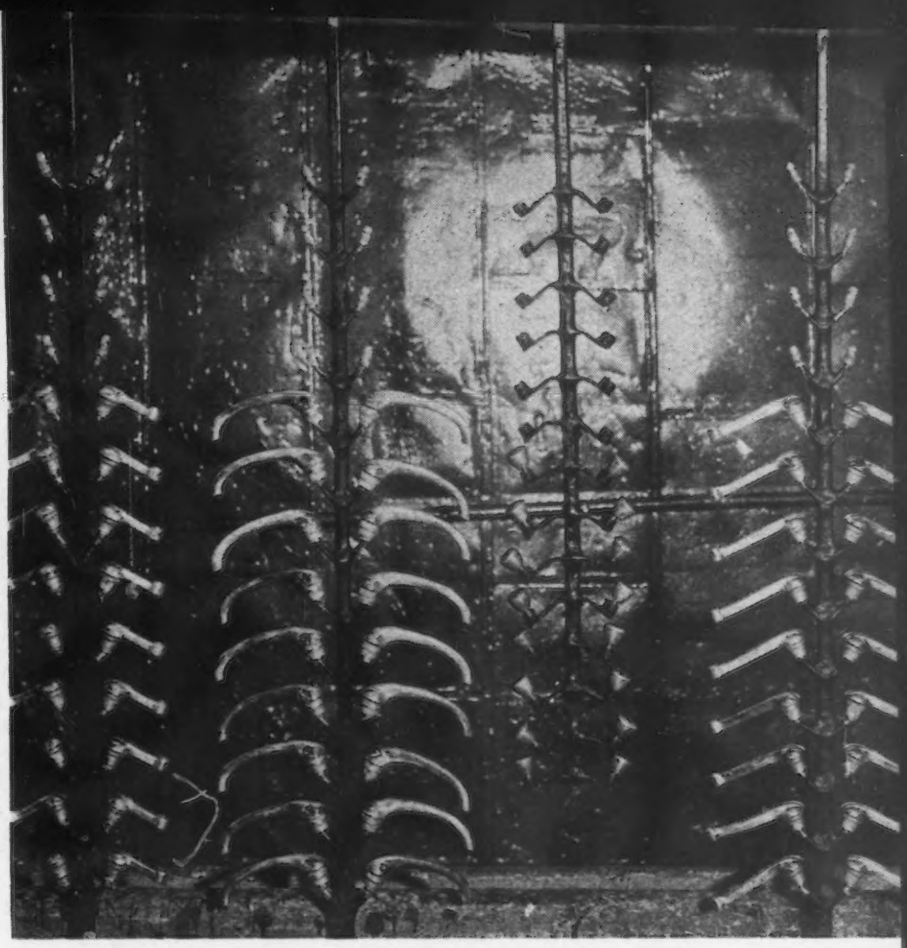


FIG. 1—Several types of plating racks used for die cast automobile hardware. Racks are kept well coated with stop-off lacquer except at electrical contact points.

PLATING technique in Ternstedt plants of General Motors Corp. follows both an exact and an exacting procedure. This is not a new departure as the need for so doing has long been recognized, but procedures have been altered and improved since the war, both to take advantage of late methods and new solutions and to provide the heavier and more enduring coatings now called for in General Motors' specifications.

Plating rates remain high, both to keep costs within bounds and to hold to required schedules. Labor requirements are lowered by using bright, high-speed solutions. Color buffing has been nearly eliminated, yet the finished die castings meet the appearance and quality standards of Fisher Body products.

Since good plating necessitates a good surface to start with, initial inspection is designed to insure castings free of surface blemishes that can be avoided through good die casting practice and by the polishing and buffing operations[1] performed before castings enter the plating department. These castings are not allowed to accumulate or to stand about after buffing and inspection, as tarnishing must be avoided to insure best plating results. Consequently, castings go promptly to cleaning and thence to plating and are kept on the move by fully conveyorized setups.

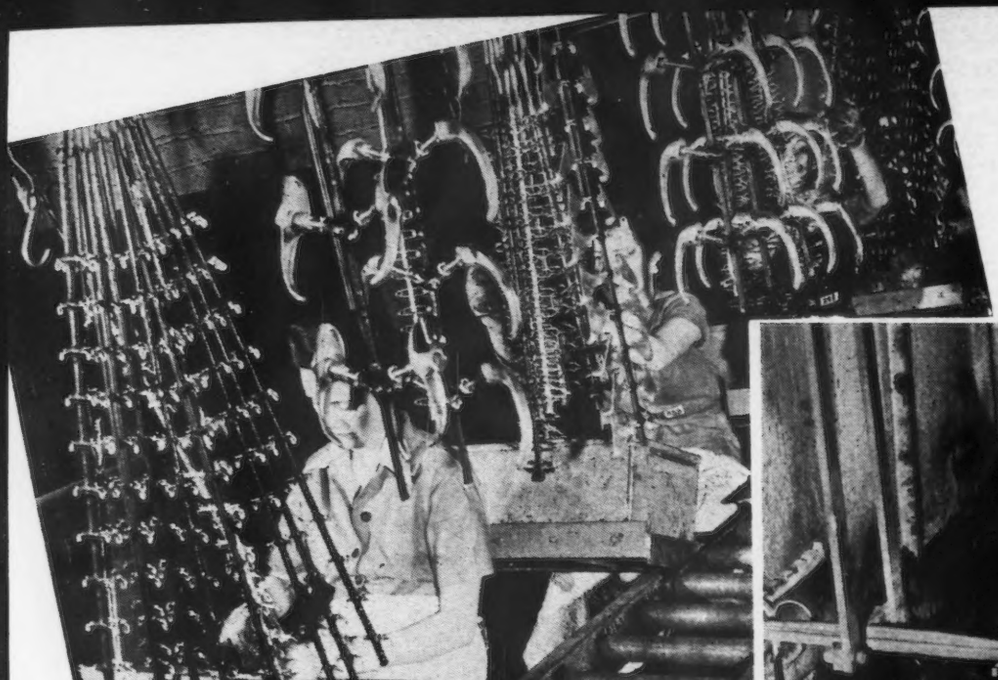
Castings, all of which are in No. 5 zinc alloy (although many contain steel inserts cast in place) go from buffing inspection in tote boxes to racking stations and, after prompt racking, continue on monorail chain conveyors through degreasing and thence to the start of plating lines where transfer to plating conveyors takes place.

Plating racks, fig. 1, are of several types, each designed to hold specific castings, but each includes a vertical bar or tube of copper with a double hook at the top and brass cross-arms or sockets so constructed as to hold the castings securely and yet make good electrical contact. Except at points of electrical contact, racks are coated with Microlyte stop-off lacquer.

Castings reach the racking stations in tote pans along a low roller conveyor. Pans are shifted onto short roller benches at right angles to this conveyor, as shown in fig. 2, and remain in a convenient tilted position before seated operators who load the racks as they hang before them and then transfer the racks to a monorail chain within easy reach. As no reracking is done before final chrome plating, the unloaded racks are stripped of chrome plate and neutralized before reuse in a solution containing 2 oz each of soda ash and of caustic soda per gal, heated to 160° to 189°F. Racks are made the anode while current at 50 to 75 amp per sq ft effects the stripping. Racks are then rinsed and put on stands for return to racking stations.

Loaded racks are first carried on the monorail chain through a three-stage trichlorethylene degreaser, passing first through vapor, then through a spray at 160°F, and finally through a final vapor at 186°F. The cleaning liquid is constantly pumped

[1] *A description of these operations is contained in the article "Polishing and Buffing Die Cast Auto Hardware,"* THE IRON AGE, *Sept. 5, 1946, p. 58.*



LEFT

FIG. 2—Racking stations alongside a roller conveyor which delivers the parts in tote pans to the stations from the buffing operation. The racks are hung on a monorail chain above the roller conveyor.

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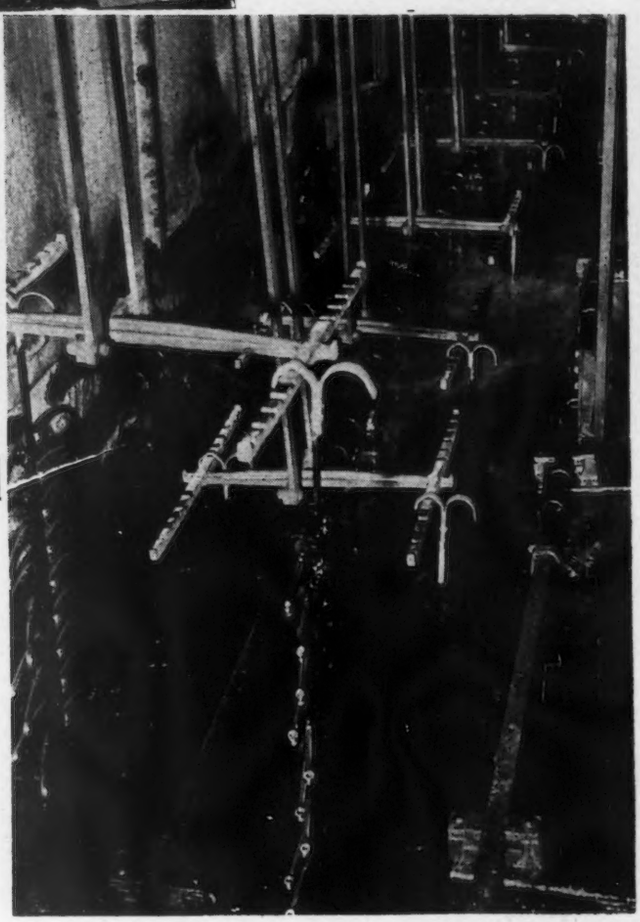
BELOW

FIG. 3—Start of the chrome plating line for interior hardware.



from the intermediate stages and, after filtering and distillation, is returned to the spray.

Plating is done on two separate lines, one for interior and one for exterior hardware, the latter receiving a thicker coating. Specifications call for a minimum total thickness of plate of 0.001 in. on exterior and 0.0003 in. on significant surfaces of interior die castings. Specifications formerly related to average thickness but now are not only much higher but also set a minimum requirement.

Both lines are served by Hanson-Van Winkle-Munning type automatic conveyors which control the timing automatically and advance the racks from tank to tank as well as through the individual tanks. For the interior line, the following procedure applies: Cathodic alkaline cleaning is first done in a solution containing 2 oz per gal of a mixture of caustic soda, soda ash and trisodium phosphate heated between 185°F, minimum and the boiling point. This cleaning lasts 45 sec at about 30 amp per sq ft and is followed by a spray rinse and then by a 30 sec dip in a 2 pct solution of sulfuric acid. After another cold rinse, the parts enter the copper cyanide strike which is a conventional Rochelle salt bath containing 4 oz of salts per gal. Current density is 40 amp per sq ft and plating continues for 5 min, bath temperature being 125°F.

This plating is followed by a spray rinse, then by two cold dip rinses and by a momentary dip in a 2 pct solution of sulfuric acid at room temperature to neutralize any alkali. Castings are then carried into the Harshaw bright nickel plating tank through which they are advanced for 18 min while being plated at 40 amp per sq ft. The solution is held at 130° F by heat exchangers and is also filtered continuously. A pump draws the solution from the bottom of one end of the tank and returns it at the top of the opposite end, effecting rapid circulation. Racks of castings, besides being advanced by the conveyor, are agitated transversely by saw-tooth cams on the guide rail.

Following the bright nickel are two cold dip rinses, after which the racks enter a conventional chromium plating solution, fig. 3, containing 32 oz per gal of chromic acid and 100 to 1 ratio of chromic to sulfuric acid. This solution is circulated and heated at 110°F. Plating continues for 3 min, at 150 amp, per sq ft density. After plating, castings receive a cold spray rinse and then a cold dip rinse followed by a hot rinse at 160°F. Racks are then hung on a chain conveyor that carries them to stations where unracking and inspection are done.

Outside hardware follows a generally similar cycle except that the initial cyanide copper plating is shorter and is followed by a long bright copper plating, fig. 4, before nickel plating. The cycle starts with 20 sec anodic alkaline cleaning followed by a cold rinse and a 20 sec etch in 2 pct sulfuric acid and another cold rinse, as with inside hardware. Initial cyanide copper plating is also the same except that it lasts for only 3 min as against 5 min. It is followed by a cold dip rinse, a sulfuric acid dip and

another cold dip rinse before the castings enter the amine type bright copper tank.

Racks are continuously advanced through this solution for 22 min with current density held at 30 amp per sq ft and the temperature 140° to 150°F. Air agitation is now used and equipment for continuous circulation of the solution is being installed as well as equipment for raising current density to 45 amp per sq ft. In this plating, a minimum of 0.0004 in. of copper or an average of about 0.0006 in. is applied.

A cold dip rinse followed by a cold spray-and-dip and then by a hot dip rinse completes this sequence and racks are shifted by hand to the nickel and chrome line. There the castings are given a 20 sec cleaning (designed to remove any remaining amine which must be kept out of the nickel bath) followed by a cold rinse and a 10 sec alkaline anodic cleaning. After spray and dip rinses, a 20-sec dip in 2 pct sulfuric acid and another cold dip rinse, racks enter another strike in a Rochelle copper solution at low current density (10 amp per sq ft) continued for 10 min at 110°F. This is followed by a cold spray dip rinse and a short 2 pct sulfuric acid dip before the castings enter the bright nickel solution. This long cyanide copper plate is not necessary in the process, but the plating machine was designed for use on both exterior and interior hardware.

Nickel plating is similar to that on the interior hardware line, employing the same Harshaw solution. This solution is continuously filtered and heated to 132°F. Work is agitated by conveyor movement, as on the other line, but plating time is 22 min at 50 amp per sq ft, during which a minimum of 0.0006 in. nickel plate is deposited.

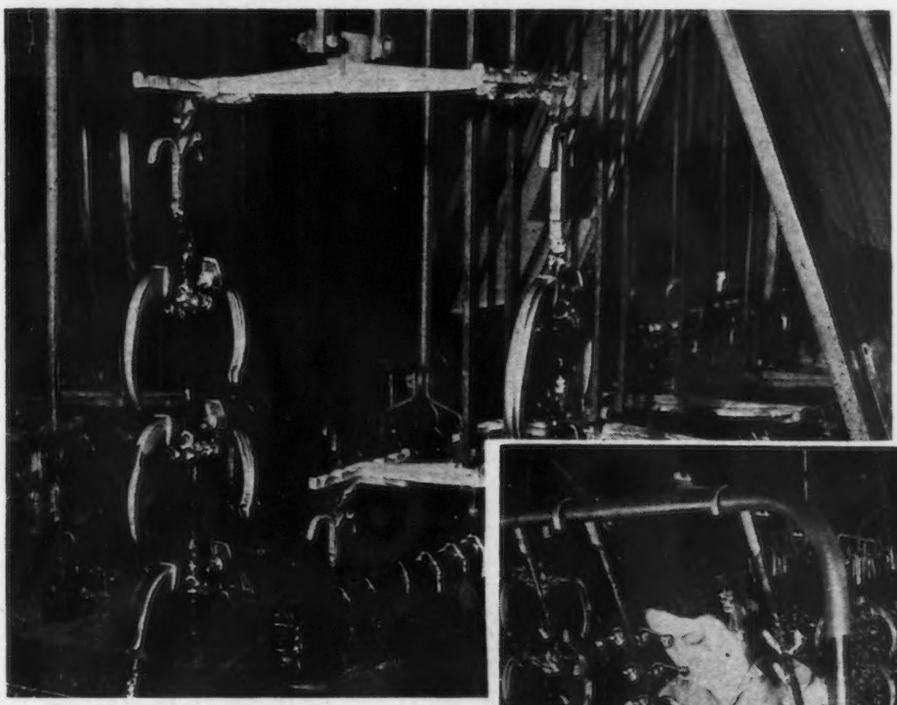
Three cold rinses follow this nickel plating after which the castings receive the same 3-min. chromium plating given on the interior hardware line. Two cold and a hot rinse succeed the chrome plating and then the racks are hung on the monorail chain that carries them to the unracking and inspection station.

Women inspectors do the unracking, fig 5, as the racks hang from supports above rather flat, white painted hoppers under which tote pans are placed. Special lighting and the light colored background make it easy to spot defects. Rejects are sorted into batches in three trays according to the type of defect present. Where defects can be repaired, without undue cost, this is done. Other rejects are returned to casting departments for remelting.

Castings that pass inspection are laid on the hoppers and slide into tote pans that rest on roller tables level with the gravity roller conveyor onto which the pans are shifted when filled. Plans are later pushed along this conveyor to a department where the castings are packed in cartons for shipment to other Fisher plants where assembly to bodies is done.

Production rates vary considerably with the size of casting, the number that can be accommodated per plating rack, and the plating line involved. Outside door handles, which are the largest castings handled and run about eight per rack, are plated at the rate of about 1000 per hr. This rate will be increased as new plating equipment is added and as castings are produced in larger quantities.

Handling is well conveyorized and is done as efficiently as the character of parts being processed permits. By using good plating practice, fast plating conveyors and solutions that make for rapid plating of high quality, the operation is made as efficient as current manufacturing conditions permit. Large savings are effected by the use of bright plate which except for occasional castings, eliminates the coloring that was necessary before this type plating was developed.



ABOVE

FIG. 4—Exterior hardware emerging from the bright copper plating tank. A hood with windows covers most of this tank.

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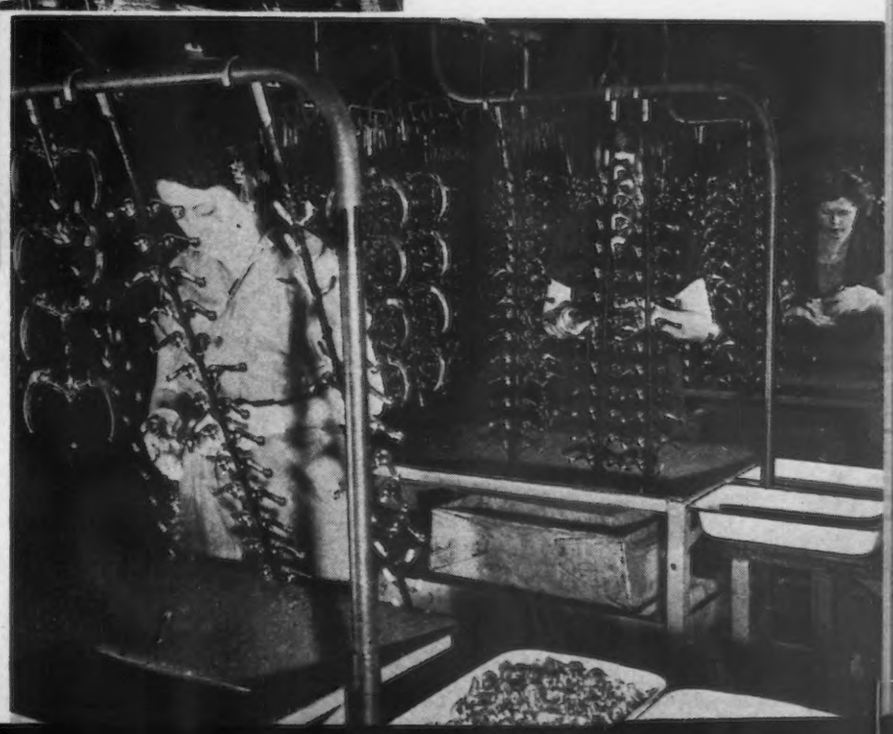

RIGHT

FIG. 5—Unracking of plated castings. Castings which pass inspection at this point drop into the hopper and from there into tote pans. Rejects are placed in trays at the right.

Heavy Alloy Aids Machine Design

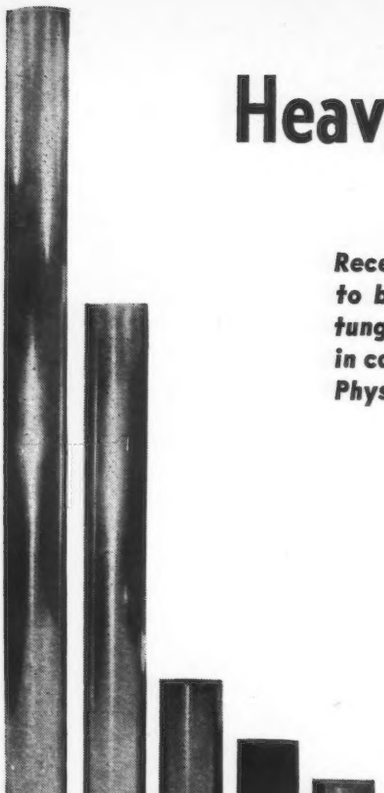

FIG. 1—Specimens illustrating the relative densities of various metals. All specimens are of the same weight and have the same diameter. The specimens are, left to right, magnesium, aluminum, steel, lead and Heavy Alloy.

Recently developed in England is a new material which while said to be equally as strong as steel has twice the density. This high-tungsten powder metallurgy product is specifically intended for use in cases where moving parts must be balanced, yet space conserved. Physical properties of the material and applications of its use are herein described.

° ° °

By G. H. S. PRICE

Research Laboratories, General Electric Co., Ltd.
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THE engineer is continually faced with the problem of balancing the moving parts of machines of all kinds. In many cases balancing is effected merely by symmetry of design, but where this is not possible, separate balance weights frequently have to be added. If space is plentiful no difficulty is experienced in accommodating these weights, and it is not too uncommon to see massive blocks of cast iron or lead serving no other purpose than that of balancing the moving part of some machine.

There are, however, many cases where space is restricted or where lead (with its low melting point and its poor mechanical properties) is unsuitable; these factors have stimulated the search for a strong material as heavy or heavier than lead. There are of course some of the precious metals, such as gold and platinum, which have densities approaching twice that of lead; but their cost makes them altogether prohibitive for use as general engineering materials.

The development of Heavy Alloy at the Research Laboratories of the General Electric Co., Ltd., England, has resulted in making available to industry a new engineering material. This material, which is as strong as steel yet twice as heavy and which may readily be obtained in massive form at a reasonable price, opens up new possibilities to the designer (fig. 1).

Heavy Alloy is a powder metallurgy product. It contains about 90 pct W, alloyed with nickel and copper, and is manufactured by sintering pressed compacts of the mixed metal powders at a temperature of approximately 260°F. Unlike pure tungsten, Heavy Alloy can be readily machined, drilling, tapping, shaping or

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RIGHT

FIG. 2 — Samples of unmachined Heavy Alloy balance weights.

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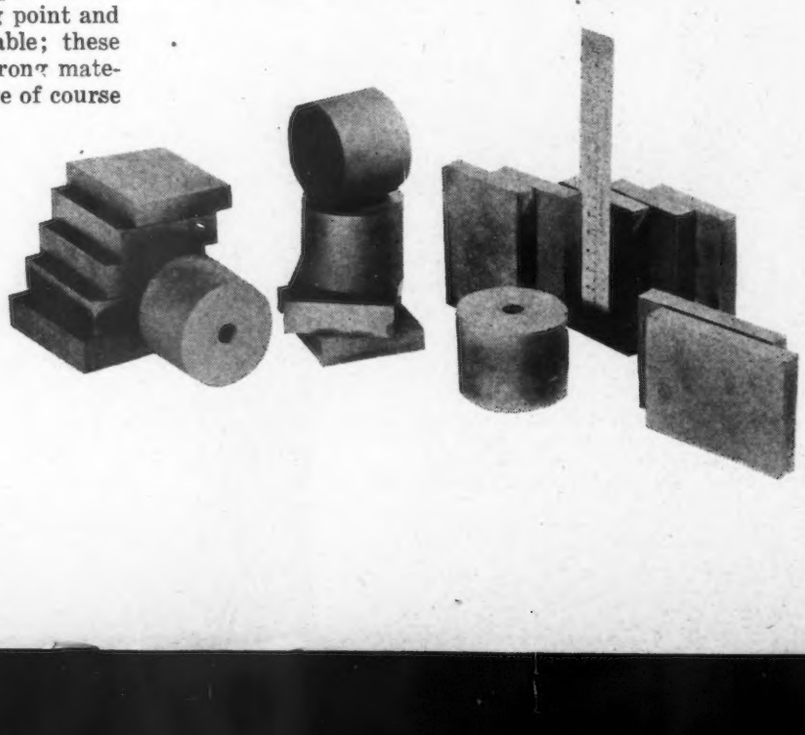


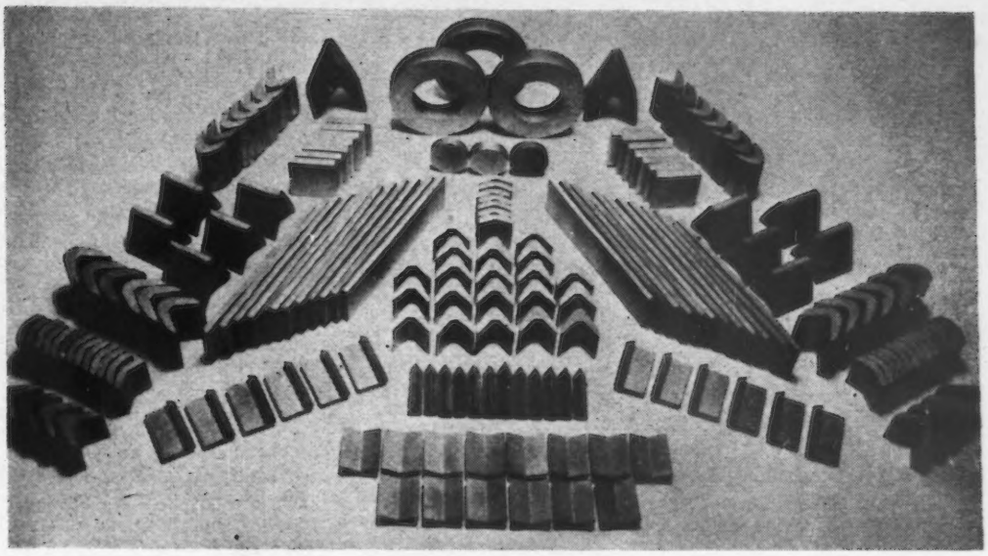


FIG. 3—Heavy Alloy contact tips pressed and sintered to size.

knurling presenting no difficulties. It is completely resistant to atmospheric corrosion and salt water attack; although, if desired, it may be given any of the usual finishes such as nickel, chromium or cadmium plating. It can be brazed and silver soldered by the usual methods, and a special method of welding in hydrogen has been developed which sometimes permits complex shapes to be built up from simple pressings. The resultant weld is indistinguishable from the parent alloy.

Production of an alloy having similar properties has been recently announced by the Callite Tungsten Corp., Union City, N. J. (THE IRON AGE, *June 27, 1946, p. 151*). *This material, designated as Dense Alloy No. 112, is available in three compositions: Type Y, largely tungsten, cobalt and nickel; type E, mainly tungsten, cobalt and silver, and type P, containing tungsten, copper and nickel.*

The most important properties of Heavy Alloy are given in the following table:

Tensile strength, tons per sq in.	42
Yield point, tons per sq in.	38
Elongation, pct in 1 in.	3
Compressive strength, tons per sq in.	130
Bhn	290
Modulus of elasticity, psi	32×10^6
Modulus of rigidity, psi	16.8×10^6
Torsional strength:	
Yield stress, tons per sq in.	12.4
Torque at fracture,* in.-lb	113.4
Angle of twist at fracture, °	1040
Surface shear stress, tons per sq in.	47
Specific gravity	16 to 17
Weight, lb per cu in.	0.6
Coefficient of expansion, 68°-788°F	5.6×10^{-6}
Electrical Conductivity, ohm^{-1} per cm^{-1}	0.68×10^{-5}
Resistivity, ohm per cm	1.47×10^{-5}
Thermal conductivity C.G.S. units	0.25

* Diameter of test piece 0.1765 in. and length under observation 4.5 in.

It is of particular interest that the aircraft industry (notwithstanding its continual drift towards the use of light and ultra-light alloys) should have provided two of the most outstanding examples of the use of Heavy Alloy. These are for balancing the flight control surfaces and the crankshafts. Thus, for example, in order to effect static and dynamic balancing of the aileron, fairly massive weights may have to be inserted in front of the rear spar within the aerofoil. The space for these weights is very restricted, and the arc through which the aileron can move may be limited by the arc through which the counter weight can move without touching the inside skin of the aerofoil. The advantage in the use of a heavy material in this particular case may be twofold. In the first place it will permit complete freedom of movement of the aileron; and second, since a smaller volume weight may be accommodated further from the axis of rotation, its effective moment will be greater or conversely the aileron may be balanced with an overall saving in weight.

Heavy Alloy has also been used successfully for balance weights on variable pitch propellers, for centrifugal clutches and vibration dampers, and for many other applications where it is necessary to put a large weight into a small space (fig. 2). It has also found valuable application in the manufacture of gyroscopes and gyrocompasses. Since the moment of inertia of a rotating body is directly proportional to its mass, it follows that a Heavy Alloy gyro rotor is capable of storing twice as much energy as one of steel of the same size.

Heavy Alloy has also proved of service in entirely different fields and particularly in electrical engineering. Owing to its high tungsten content, Heavy Alloy is an ideal material for the arcing contacts of oil immersed heavy-current circuit-breakers. Tungsten with its low vapor pressure has long been recognized as a good material for this purpose, but it is difficult to produce the metal in the sections required for contacts. With Heavy Alloy this difficulty does not arise and, being a pressed and sintered product, it is possible to produce contacts to exact dimensions and thus obviate machining (fig. 3). Heavy Alloy contacts have proved to be very resistant to the destructive action of the arc.

Finally, it is of interest to note the extensive use of this material as a container or bomb for relatively large masses of radium, such as are used in radium beam therapy or for the radiographic examination of materials. Heavy Alloy was, in fact, originally developed for this purpose, since the use of radium necessitates adequate protection against the harmful gamma rays. The absorption of the gamma-radiation by metals is directly proportional to their specific gravity; thus the higher the specific gravity of the metal used, the smaller the size of the container. Most of the important radium centers in Great Britain are equipped with Heavy Alloy radium containers.

Cork Slab Foundation For

Heavy Machine Tools

INSTALLING vibration-free foundations for heavy machine tools on poor grade filled land poses a problem which seems to have been overcome by an interesting new design recently applied at the works of Muir Machine Tools Ltd., Manchester, England. The hobbing machine for which the first foundation was designed weighs, with its load, up to 117 tons, and the accuracy of the working is such that a deviation of 0.0005 in. in 120 in. vertically and horizontally is the maximum amount permitted. The need for a perfect foundation arose because of the poor bearing quality of a new site which was demonstrated when attempting to re-cut a turbine gear, and the additional load of the gear, 14 tons, and the pot casting, 2 tons, caused a subsidence of 0.060 in. in 6 ft.

The demand therefore, was for the construction of a floor bearing such that if movement of the machine should take place through subsidence, it would all move in one plane, and the foundation bed should be capable of being unevenly loaded without showing appreciable misalignment. It was required also that the foundation bed be free from vibrations when the gear hobbing machine was being tested, and that it be insulated from vibrations set up by other machinery such as electric traveling cranes and machine tools.

Research engineers of David Brown & Sons (Huddersfield) Ltd., the parent company of Muir, felt that in view of the nature of the filled ground, and the high degree of machining accuracy required, something more than the sand method of insulation was needed. As a result, a concrete bed carried in a cork slab cradle varying from 2 to 4-in. thick, embedded in bitumen, and with a ¾-in. layer of asphalt, was approved. Provision had to be made so that the machines could be leveled up on the foundation bed, and for this purpose a 9-in. thick steel bedplate was provided.

Early doubt as to the advisability of using cork, it being thought that it would be likely to compress with the variable loads placed on it and throw the machine which was being assembled and tested out of line, was overcome. It has been found that the concrete block resting on the top of this cork foundation is sufficiently rigid in itself to prevent any misalignment, and that in the event of any movement the block will move as a whole, and the alignment of one part of the machine relative to any other part will not be altered.

In view of the accuracy of working essential for the hobbing machines, it was necessary to found the basis upon a stratum which would obviate unequal settlement of the machine base. Because of the proximity of crane stanchions and other foundations, insulation of the foundations against the transmission of external vibrations to the machines was also important, since the rate of working of the machine is slow enough to permit of the small internal vibrations in machines of high precision being absorbed by its own bed frames.

To damp out ground vibrations set up by the use of the crane or other machinery in the neighborhood, a 14 ft 6 in. pit was excavated, consisting of walls and an underbed slab of reinforced concrete lined internally with ¾ in. of asphalt and compressed

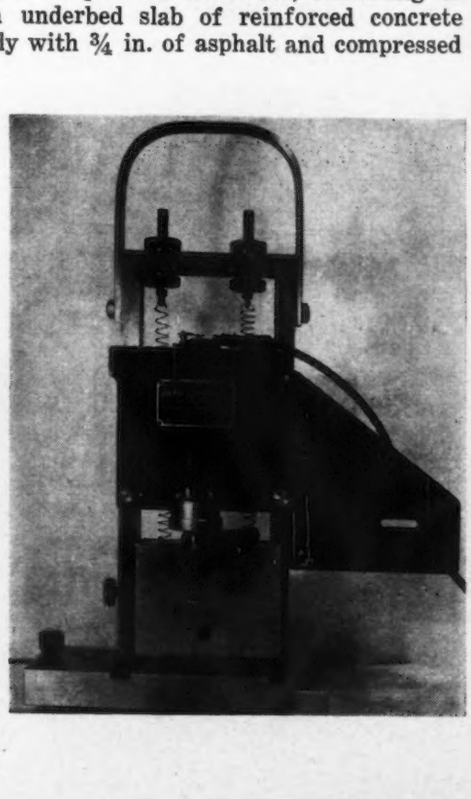
FIG. 1—Close-up of a corner of the foundation, showing the cork slabs bedded against the asphalt.

o o o

RIGHT

FIG. 2—The vibrograph designed and constructed by the David Brown research department set up for measuring vibration amplitude in a vertical plane. For horizontal measurements, the Vibrometer is attached to the projecting plate at one side.

o o o



cork slabbing. The cork is bedded into hot bitumen against the asphalt and around the edges as shown in fig. 1 and lined on the inside with Kraft paper to protect it against the deposition of the concrete forming the machinery foundation.

The foundations consist of mass concrete beds finished to a level surface for bedding the 9 in. steel leveling plates, and cast within the reinforced concrete pits lined with asphalt and cork. These beds and reinforced pits are supported on 3 ft thick mass concrete walls which transfer the load down to the ballast stratum. The T slotted cast-iron bedplates were laid over the entire foundation area of approximately 30 x 10 ft so as to present a perfectly level machined face at floor level, and after leveling were filled with liquid grout, great care being taken to insure the flow of the liquid under their entire area.

A further foundation to carry a pinion hobbing machine of a maximum weight of 35 tons is under consideration on similar lines.

To measure the degree of improvement effected by these special foundations, the vibrograph shown in fig. 2 was designed and constructed by the firm's research department. This instrument comprises a heavy steel block forming a floating mass suspended by long springs from a frame. The frame rests on the vibrating body and vibrates with it, but the springs are not strong enough to cause the block to follow rapid vibrations of the frame and so the block remains stationary in relation to the mean position of the frame, and the Davey Vibrometer measures the relative motion between the frame and the block.
effected. All readings represent double amplitude of

The accompanying tables show the improvement vibration in 0.0001 in.

TABLE I

Measurements taken on previous foundation with all cranes operating

(Instrument mounted directly on floor)

	Frequency	A	B	C	D	E	F	Average Reading
N-S	High	1	1	1	1	1	1	1
	Low	4	3	2	1	1	2	2.16
E-W	High	1	1	1	1	1	2	1.16
	Low	3	2	4	4	2	3	3
Vertical	High	2	1	2	1	1	1	1.33
	Low	5	3	4	3	2	3	3.33

TABLE II

Measurements taken on completed foundation with all cranes operating

(Instrument mounted directly on bedplate)

	Frequency	A	B	C	D	E	F	Average Readibg
N-S	High	0.25	0.1	0.1	0.25	0	0	0.11
	Low	0.5	0.25	0.25	0.5	0.1	0.1	0.30
E-W	High	0	0.25	0	0	0	0	0.04
	Low	0.5	0.5	0.25	1	0.1	0.1	0.40
Vertical	High	0	0	0	0	0	0	0
	Low	0.1	0.1	0	0.1	0.5	0	0.13

Copper Stripping Methods

A CRITICAL survey of methods in use or suggested for the stripping of copper was contained in the report of research project No. 1 of the American Electroplater's Society, presented at the society's annual meeting in Pittsburgh earlier this year. The report was made by F. C. Mathers and E. L. Martin, chemistry department, Indiana University, Bloomington, Ind. The report pointed out that methods now in use are (a) Chemical methods—Concentrated nitric acid, ammonium hydroxide or carbonate, chromic acid, sulfide-cyanide, and acetic acid-sodium nitrite-sulfuric acid, and (b) electrolytic methods—cyanide, nitrate and pyrophosphate.

The most important developments were made with the sulfide-cyanide process, according to the report. It is felt that these discoveries are entirely practical, and that they can be applied immediately with desirable economic savings. Calcium polysulfide, sold as lime-sulfur and at a very low price for agricultural use in spraying orchards is entirely satisfactory for the process. Moreover, this solution can be regenerated or maintained at full strength indefinitely by adding the required quantity of sulfur plus enough new lime-sulfur solution to replace drag-out. This method of regeneration applies to all sulfide solutions studied.

A more important discovery is that sodium polysulfide is much superior to the calcium polysulfide. The copper sulfide which is formed is so loosely adherent that, under the best condition, as much as 95 pct can be washed off in a strong jet of water. This results in a great saving in sodium cyanide. The sodium polysulfide solution can be easily prepared by dissolving the sulfur in a boiling solution of sodium hydroxide. This requires about 30 min. A little Orvus hastens solution, but it is not really necessary.

The recommended solution consists of 20 oz per gal of sulphur and 13 oz per gal of sodium hydroxide at 85 to 95°C but the concentration is not critical.

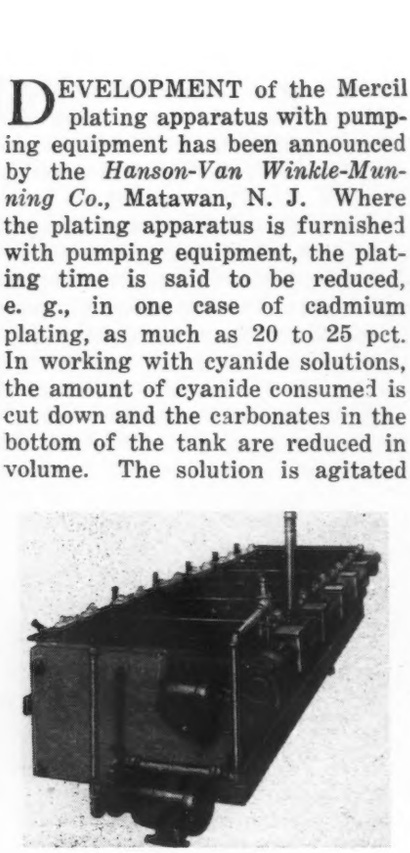
Concerning zinc base die castings, the report stated that zinc alloys cannot be deplated in cyanide solutions because of excessive corrosion or dissolving of the basis metal by the electrolytic action. Also, the action of cyanide on the zinc alloy is serious even on open circuit. However, the sulfide-cyanide process seems the best of all. The sodium polysulfide solution (13 oz NaOH and 13 oz sulfur) caused a loss of 0.001 g per sq in per hr on polished zinc-base die castings. The copper sulfide formed with the sodium polysulfide was so loosely attached that it could be very completely removed by a jet of water. As a result, such a short treatment in the cyanide was necessary that the corroding action on the basis metal was lessened.

New Equipment . . .

Cleaning and Finishing

Recent developments in plating units, dryers, solvent and vapor degreasers, steam cleaners, sandblasting machines, barrel platers and finishing room materials are described in this week's review.

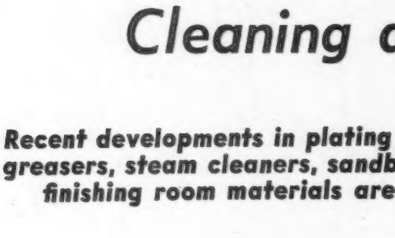
DEVELOPMENT of the Mercil plating apparatus with pumping equipment has been announced by the *Hanson-Van Winkle-Munning Co.*, Matawan, N. J. Where the plating apparatus is furnished with pumping equipment, the plating time is said to be reduced, e. g., in one case of cadmium plating, as much as 20 to 25 pct. In working with cyanide solutions, the amount of cyanide consumed is cut down and the carbonates in the bottom of the tank are reduced in volume. The solution is agitated



by the pump, obtaining, it is claimed, a finer grade of plated work. An iron pump is furnished where cyanide solutions are involved, whereas in acid solutions, such as nickel, a Duriron pump is specified. The pump capacity is from 25 to 100 gpm depending upon the size of the installation.

Continuous Air Dryer

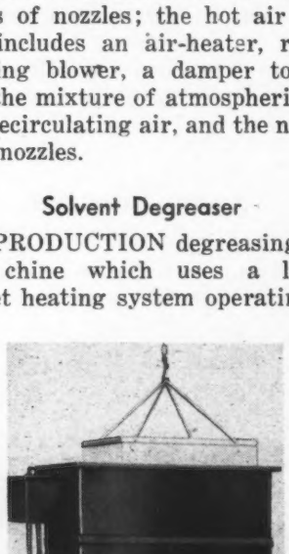
A MACHINE designed to dry loaded racks continuously before or after plating, or after any other type of water-solution dip, has been introduced by the *Optimus Equipment Co.*, 137 Church St., Matawan, N. J. The machine is continuous in its operation, and works almost completely closed. It can be connected to an exhaust blower, so that all fumes can be drawn off. Any heating system, steam, gas, or electricity, can be employed and drying time is usually 4 to 6 min. The machine can be used as a single-stage dryer or in



connection with a number of successive operations, alkaline, acid, or neutral. It is said to be most efficient as a stainless dryer, although other uses are practical. The cold air system includes a blower and a series of nozzles; the hot air system includes an air-heater, recirculating blower, a damper to adjust the mixture of atmospheric air and recirculating air, and the necessary nozzles.

Solvent Degreaser

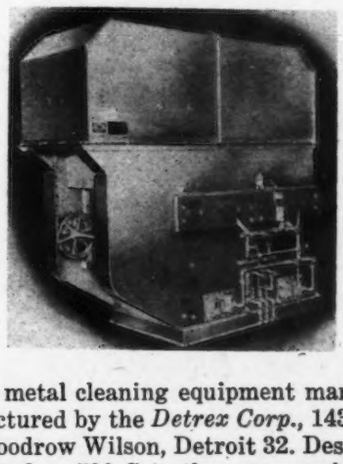
A PRODUCTION degreasing machine which uses a liquid jacket heating system operating at



atmospheric pressure has been developed by the *Mabor Co.*, Walnut St., Clark Township, N. J. This system is said to provide gentle, uniform heat, thereby avoiding the danger of the solvent overheating and reducing the necessary amount of fluid in the equipment. No coil or heater is located in the bottom of the tank. The degreaser can be heated with high pressure steam without the use of a pressure-reducing valve, or with gas or electricity, and is equipped with an automatic control system that preheats the circulating water above the dew point. An automatic oil and grease skimming device is standard equipment. Distillation is handled in the equipment without danger even when the last drops of solvent are being distilled, it is claimed. The machine is installed by simply connecting the heat and water lines.

Vapor Degreaser

SMALL basketed parts can be cleaned in a two-dip immersion vapor degreaser added to the line

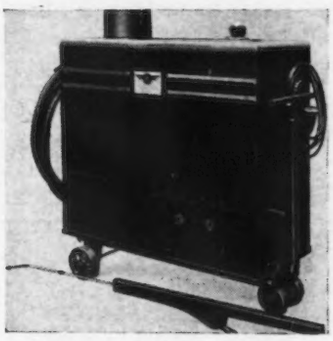


of metal cleaning equipment manufactured by the *Detrex Corp.*, 14331 Woodrow Wilson, Detroit 32. Designated a 500-C-1, the conveyorized machine permits a choice of several cleaning cycles. The type and degree of soil contamination are the deciding factors in the selection of the appropriate method of cleaning. Immersion-vapor, vapor-immersion-vapor and boil-rinse-

vapor are the cleaning cycles. The 500-C-1 is fabricated from 10-gage steel plate, reinforced with structural steel of all-welded construction. A water jacket condenser, tested for a working pressure of 40 psi, completely circles the machine and beneath the condenser is a clean solvent collecting trough. The degreasers, which have hourly work load capacities of 2000 to 4000 lb, incorporate eight sizes of baskets ranging from 8 x 18 x 6 in. to 18 x 36 x 12 in. Up to 180 baskets of parts are cleaned each hour.

Vapor Steam Cleaner

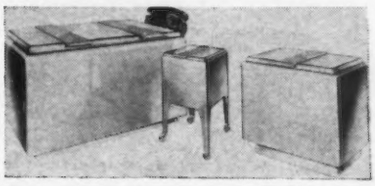
ANNOUNCEMENT of a vapor steam cleaning machine for cleaning road, construction, railroad, marine and production machinery, auto and truck bodies and engines, airplane fuselages, tanks, and vats and for stripping paint, has been made by the *White Engineering & Mfg. Co.*, 116 West Passaic St., Rochelle Park, N. J. The machine, designated as model MO-46B, is manufactured as a station-



ary, movable with casters, or trailer-carried unit. Two easily accessible valves enable one man to operate the machine, and pressure once set, is automatically controlled throughout the cleaning operation. Adjustment of the mixture is made possible by one of these two valves, which permits regulation from full concentration of cleaning compound to clear vapor for rinsing. A system of instantaneous electric ignition enables the working pressure of 100 lb to be rapidly reached. Operation pressures are 75 to 125 psi. Special sootless downdraft burner and extra long flame travel are said to allow perfect combustion eliminating deposits of unburned fuel on the heating coils. The cleaner burns No. 1 fuel oil, kerosene, or light oil and can be used with any high grade steam cleaning material of standard make.

Parts Cleaning Systems

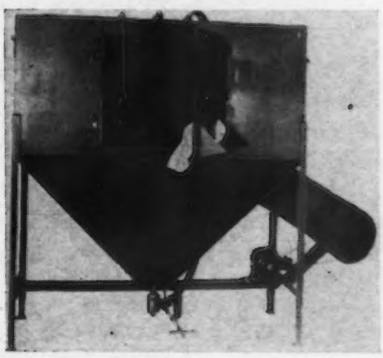
THREE parts cleaning systems for industrial plants have been announced by *Gray-Mills Co.*, 1948 Ridge Ave., Evanston, Ill. Model H-71 is a general utility unit, successor to Model P-70, and incorporates a centrifugal pump which is used for hose-cleaning parts and for agitating the fluid to accelerate the cleaning of either large parts or small parts cleaned in baskets. A means for air agitation is also



provided. A safety device causes the cover to close automatically in case of fire. The overall size of this model is 38 in. long x 34½ in. high, and 21 in. wide. Model J-75, measuring 60 x 34½ x 33½ in., is equipped with a high volume, high pressure rotary pumping unit for hose-cleaning motor blocks and other large parts. The pumping unit is portable and may be used as a general purpose transfer pump for solvents, oils, etc. This model is also equipped for agitating the fluid by means of air or pump. The smallest of the three, Model L-73, is a portable unit measuring 21 x 21 x 34½ in., frequently used with a fast acting type of solvent, such as Speed-Agitene, for cleaing carburetors, fuel pumps, etc.

Sandblasting Machine

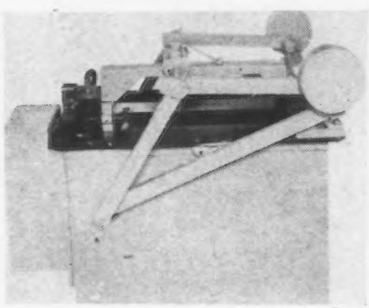
FEATURING a combination door and armholes with cuffs, which readily swing wide open for easier ingress and egress of the articles to be sandblasted, a self-feeding sandblast machine has been



put on the market by *Leiman Bros., Inc.*, 144 Christie St., Newark 5, N. J. The self-feeding unit has a sand magazine from which the sand is fed through the nozzle on to the work, after which it is returned by gravity to the sand magazine to be refed to the nozzle. The machine is equipped with a rotating, motor-driven, basket for handling small articles like bolts or buttons. When sandblasting is required on larger pieces of work, the basket is removed and the operator holds the work under the nozzle, turning the piece over and over until it is entirely cleaned. It is claimed rust, scale, or carbon deposits are quickly disposed of, and by cleaning castings of burnt casting sand deposits, quicker machining operations result.

Barrel Plater

THE intermediate barrel plater, introduced by *Lasalco, Inc.*, 2910 LaSalle St., St. Louis 4, incorporates several time and effort saving features. Loading and unloading is made quick and easy by a counterbalancing arrangement which automatically places the cylinder in correct position. Loading trays are unnecessary. A switch



type negative contact is made automatically when the cylinder is loaded into the tank and an insulated negative connection through the hollow hub of the cylinder prevents interference while loading or unloading. The intermediate plater is arranged for three speeds, has a ⅛-hp motor, a 10 x 18-in. hard rubber cylinder with 8-qt or 30-lb capacity, and is furnished with a steel tank for cyanide solutions or rubber lined tank for nickel solutions.

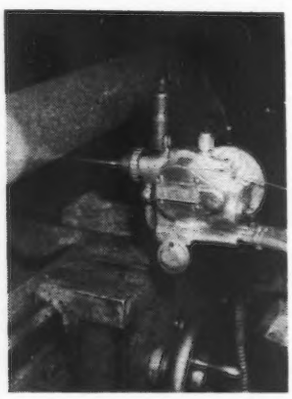
Bright Dips

SEVERAL Troxide bright dip formulas which are said to eliminate the serious hazards present in the conventional bright dip formula consisting of sulfuric acid and nitric acid, have been developed by the *Waverly Petroleum Products Co.*, Drexel Bldg., Philadelphia 6.

It is claimed that with these formulas there are no offensive fumes, the solutions are easy to prepare, and the danger of accidental splashes on the skin is eliminated. A brilliant finish, speed, and economy are provided in these bright dips.

Metallizing Gun

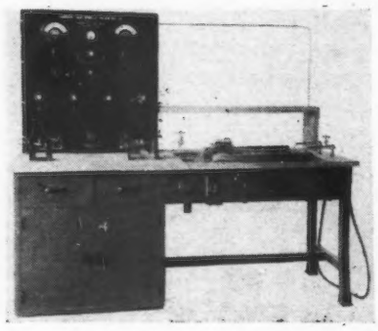
A REVOLUTIONARY metallizing gun designed for heavy-duty, continuous operation has been announced by the *Metallizing Engineering Co., Inc.*, 38-14 30th St., Long Island City 1, N. Y. Known as the Metco Type Y, this gun has been built specifically for mechanical mounting and continuous operation. Outstanding features include the use of 3/16-in. wire, which, when combined with an acetylene pressure of 15 psi more than doubles previous spraying speeds, it is claimed. Because it is designed with a disregard to weight and size limitations necessary for a hand gun, this unit is much heavier and more rugged in construction. Larger gears, worms and bearings virtually eliminate



wear and replacement. Another improvement is its fluid lubrication, and a built-in forced feed pump assures an adequate supply of lubricant to all bearings regardless of operation position. The gun is nonsensitive to gas and oxygen pressure variations as much as 10 lb, it is said, either while lighting or while spraying.

Electroplating Control Table

DEVELOPMENT of an electroplating control table, a complete miniature plating laboratory designed for either routine control of plating solutions or research work on electroplating problems and processes, has been announced by the *Hanson-Van Winkle-Munning Co.*, Matawan, N. J. With this control table, test panels can be plated under closely controlled conditions so that the results of additions, impurity removal treatments and variations in operating conditions can be observed. Only a few hundred milliliters of electrolyte



are required to conduct these tests. The table is constructed of steel, with a special corrosion-resisting finish. Above the working space is a 36 x 36-in. control panel on which are mounted all instruments and service outlets required for electroplating tests. Four Hull cells and four special cells for bent cathode tests with the necessary leads and jacks are provided. Each plating position is normally fitted for the delivery of 15 amp, equivalent to 273 amp per sq ft on a 1 x 4-in. bent cathode test specimen. Meter ranges can be altered to suit requirements.

Brass Corrosion Preventive

UNDER the trade name of Brass Lyfe, a corrosion inhibitor has been manufactured by the *Bee Chemical Co.*, 63 East Lake St., Chicago, specifically for copper and its alloys. It is furnished as a 10 pct solution of the active organic chemical, in butyl cellosolve, and is miscible with oils, lubricants, and lacquers. When added to these it is said to stop corrosion due to oxygen, organic acids, or amines. Also available are drawing compounds and soluble oils embodying this brass corrosion preventive.

Fingerprint Remover

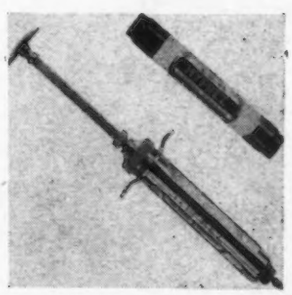
CALLED Tectyl 472, a combination fingerprint suppressor, remover and temporary rust preventive has been announced by the *Freedom-Valvoline Oil Co.*, Freedom, Pa. Applied by brush, spray, or dip, it provides a transparent, thin film of 0.0002 in. Besides serving as fingerprint suppressor and remover, it can serve as an undercoat for heavier types of rust preventives. It may be used for cutting oil operations as a water displacer and temporary rust preventive. Slushing or spraying ferrous and nonferrous metals with Tectyl 472 not only renders perspiration and fingerprint residues inactive but also effectively removes these contaminants within 1 min, it is said.

Phosphate Coating

TO create a heavy iron manganese phosphate coating on steel which retards rust and when oiled prevents excessive wear on friction surfaces, the *American Chemical Paint Co.*, Box 301, Ambler, Pa., has introduced Thermoil-Granodine, which is especially useful to manufacturers of pistons, piston rings, cam shafts, tappets, etc. The oil-absorbing surface created by Thermoil-Granodine quickly burnishes, and holds the lubricant, thus largely eliminating the dangers in the breaking-in period of high-speed machinery. It is said to make an excellent finish for many hardware items and when used under paint provides good rust protection.

Diamond Compound

FOR fine grinding, lapping and polishing, Hyprez diamond compound, announced by the *Engis Equipment Co.*, 431 South Dearborn St., Chicago 5, is a prepared abrasive containing only finely

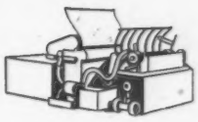


graded, pure diamond powders, newly crushed and carefully graded according to National Bureau of Standards specifications, evenly distributed and permanently suspended. The compound is a cost saving factor, it is claimed, suitable for many jobs requiring high scratch-free finish and surface luster. It is available in a large variety of grades each identified by a distinguishing color. The compound is furnished in clear Pyrex cartridges which fit into syringe-type applicators.

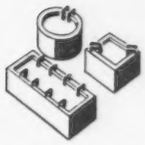
WHEN

YOU'RE FIGURING FUEL-COST-PER-TON —FINISHED AND SHIPPED

YOU CAN'T AFFORD DOWN-TIME FOR POT REPAIR



YOU WANT THE WORK AND THE PROCESS (NOT THE FIRING) TO FIX POT SHAPE



THEN

the logic of KEMP tin and lead melting shows up

FUEL costs, for melting, as in dip tinning or lead patenting, are no small factor in the ultimate cost-per-ton of product. Therefore, the opportunity to cut them 30 to 40% by more efficient firing is something to think about.

It's not at all unusual for a switch to KEMP immersion-firing to save that much—because the heat (all of it) is liberated right in the molten metal, not outside the pot. And none is lost to the setting except by flow through the work.

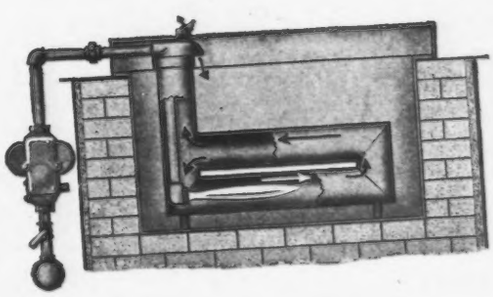
By the same token, pot wall temperatures are lower (from the molten metal temperature *down*)—and more uniform! That's why you enjoy longer pot life with less down-time for maintenance and repair.

And KEMP immersion-firing loops can be of any shape you wish. They can be located in the bath where most convenient to your work and your process. You have full freedom in specifying the setting style you want.

There are 29 years of experience in carbureted-combustion and immersion-melting behind the coupon in the corner. Use it.

WITH MODERN IMMERSION-FIRING YOU HEAT THE METAL—NOT THE POT

Combustion is within tubular loops totally immersed in the metal. Recirculation of hot combustion gases around each loop (driven by the force of the burner flame) promotes efficiency and uniformity of temperature over the loop surface. When the hot gases do exhaust, they vent down over the molten metal surface, reducing heat losses from the system, and minimizing dross. Standard designs have metal capacities from 2 to 20 tons—special sizes and shapes, and larger capacities, quoted on request.



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PRECISION CARBURETION + ADAPTED COMBUSTION
FOR INDUSTRY'S HEAT-USING PROCESSES

ATMOSPHERE GENERATION & ADSORPTIVE DRYER SYSTEMS
FOR PROCESS CONTROL AND PROTECTION

JMLco K-K1-1a

The C. M. Kemp Mfg. Co.
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Have a field-engineer come look at our soft-metal melting setup. We want to save 30 to 40% in fuel cost..... ☐

NAME_____

TITLE_____

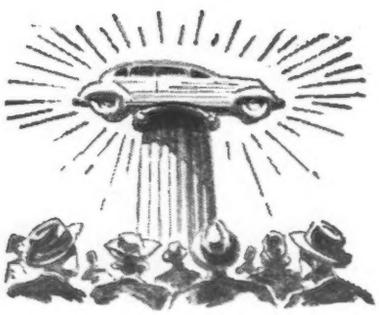
COMPANY_____

PLACE_____

Assembly Line . . . .

WALTER G. PATTON

• Steel industry notifies auto producers steel will be available for no more than 4 million cars in 1947 . . . Foundry operations tighten auto production lines.



DETROIT — With the stock market skidding precipitously and automobile and truck production 4200 units under the peak established earlier this year, two major indexes of Detroit industrial activity were nevertheless at or within reach of new peacetime highs last week.

The employment index compiled by the Detroit Board of Commerce is estimated to be continuing near the peacetime record of 139.2 established on Aug. 15. During the same period, the 30 min demand for Detroit Edison electrical service hit a new all-time peak of 1,090,600 kw on Tuesday morning. At the time a heavy lighting load (partially resulting from a rainstorm) and a substantial demand by Detroit housewives doing their weekly ironing were superimposed on a heavy industrial demand to create the new system record. Total kilowatt-hour consumed is lagging about 9 pct behind last year.

It is evident enough, however, that Detroit was busy producing things last week even though some national business barometers were falling. The number of *completed* automobiles also failed to reflect the strong industrial tempo.

Strikes and shortages still hobbled automobile assemblies with a total of 59 work stoppages affecting GM production alone. A total of 25 of these strikes have been in effect more than 60 days.

HOW much of the city's industrial output was going to build up stocks either in the hands of manufacturers or their dealers was a question no one seemed to want to discuss although inventory figures compiled by the U. S. Dept. of Commerce indicated that the dollar value of inventories of automobile and equipment manufacturers was climbing rapidly. Using 1939 as a base, the following inventory index for the automobile and equipment industry has been prepared from figures sent in by 1200 reporting firms representing approximately 40 pct of manufacturing.

1945		1946	
August	171.4	January	190.8
September	173.2	February	200.1
October	177.9	March	209.7
November	175.3	April	221.9
December	186.9	May	223.0
		June	230.8

Much of this increase is undoubtedly due to increased prices and some may be accounted for by the fact that several producers had planned to use two shifts and would need large banks of parts, especially in times like the present. Admittedly, inventories in the hands of automobile producers are badly unbalanced and this is undoubtedly a major contributing factor in the present size of inventories.

The motor industry was back to normal in one respect, however. While some motor car producers have been talking recently about building six million cars in 1947, the steel industry is reported this week to have put the industry on notice that steel will be available in 1947 for no more than four million cars. Thus the steel industry and the automobile industry were reported to be about two million cars apart insofar as steel requirements and available steel are concerned.

Part of the basis for these calculations appears to be that the present maximum capacity of finished sheet and strip steel will rise only from 21 million tons at present to about 24 million tons by the end of 1947.

THE automobile sheet and strip quota most frequently mentioned is 40 pct although automobile producers say they have taken only 37.4 pct of the 1940 sheet and strip production, 33.7 pct in 1941 and only 13.1 pct in 1945. However, with practically all U. S. industries asking for quantities of steel in excess of their 1941 requirements and with government priority orders taking as much as five million tons for the food pack in addition to the growing tonnage needed for the agricultural implement and housing programs, it is not to be wondered at that the motor industry can see little improvement ahead in the sheet and strip steel supply situation.

Exact figures showing the amount of steel required for a motor car are exceedingly difficult to obtain. A recent survey computes the gross amount of steel required to build the average car to be 3412 lb; for the average truck the figure is reported to be 4080 lb. For the average composite vehicle this would represent a requirement of 3530 lb of steel of all types. Thus, in a four million car year, the automobile industry would need seven million tons of steel for new vehicles. This would have to be increased by the requirements for replacement parts which at the present time is substantial and probably is now well above the 47 lb for every car in operation which is the latest figure available.

Another rule of thumb sometimes used in computing the steel requirements of the automobile industry is that three bodies can be made from a ton of sheet steel. Expressed another way about 1200 lb of sheet steel are required for an average car and its replacements.

It is doubtful, however, if these figures apply to present models which are somewhat heavier than their predecessors. As a matter of fact, it is reliably reported that one car in the luxury class requires 400 lb more steel than its predecessor model. A substantial part of this increase is said to be accounted for by the air conditioning system installed in the newer model.

A survey of automobile compa-

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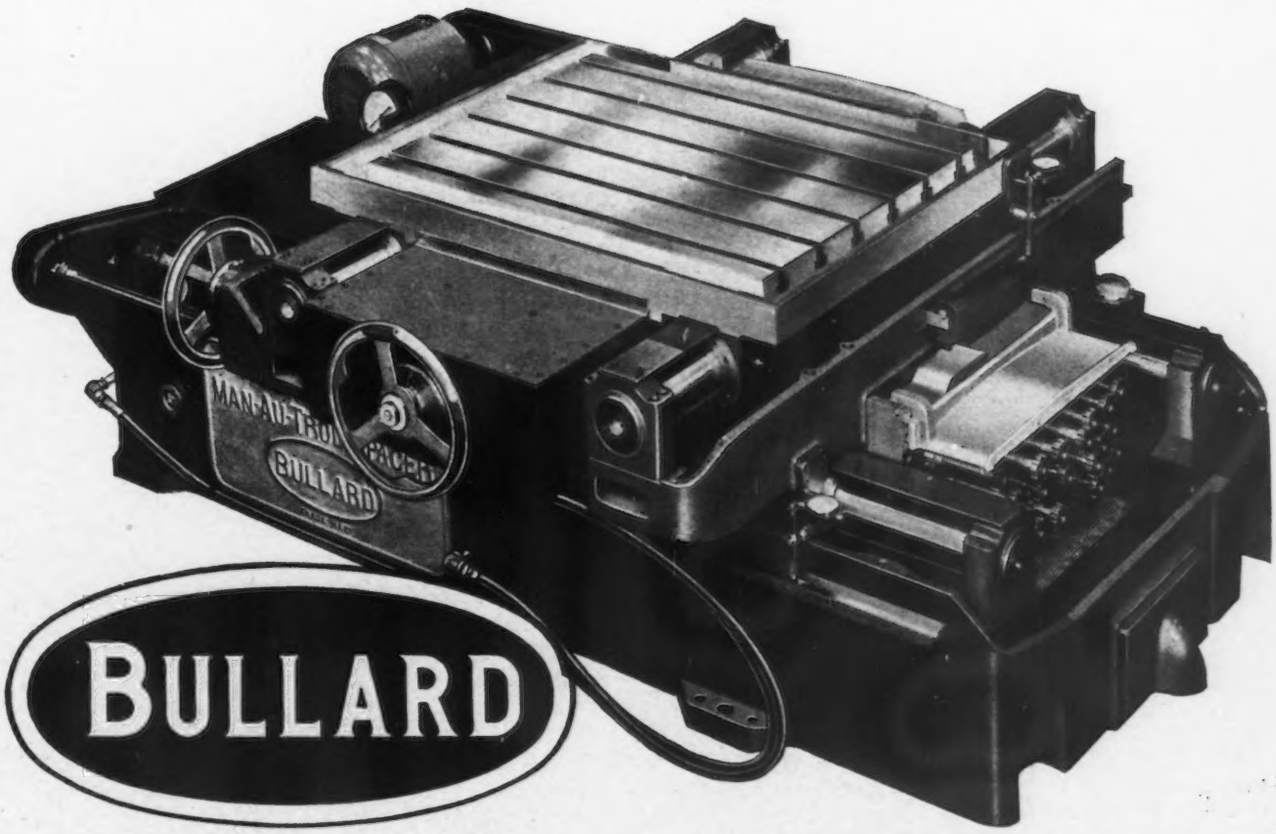
Saves time, money and labor in your Drilling Operation

Designed for installation *by you* on your drills, the new Bullard MAN-AU-TROL Spacer, in most cases, eliminates hole-locating jigs... and the time, money and labor required to design, make, handle, repair and store them.

With unprecedented speed, ease and accuracy, you can set up the Spacer to do the work of jigs that may take weeks or months to make. Once its lateral and longitudinal position stop rods are set for a pattern of holes, the manually controlled, automatically operated Spacer will repeat that pattern indefinitely *to the highest standard of commercial spacing accuracy.* Extreme flexibility permits the use of the Spacer on a large variety of large and small work.

The results: faster, more accurate production . . . lower costs . . . less overhead . . . less human fatigue —all valuable factors in improving your competitive position. Write for MAN-AU-TROL Spacer Bulletin. The Bullard Company, Bridgeport 2, Connecticut.

NOW... BULLARD ELIMINATES JIGS for drilling, boring, reaming, tapping!



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CREATES ***NEW METHODS*** TO MAKE MACHINES DO MORE

Made in 2 sizes — 30" x 20" (illustrated) for larger work on 4', 5' and 6' Radial Drills; and 4" x 4" for work usually done on smaller types of drills.

nies indicates that steel producers are doing a reasonably good job in delivering steel in the face of many difficulties and except in a few cases there is little dissatisfaction in the way the steel problem is being handled by steel suppliers. All flat-rolled products are short but hot-rolled items are reported to be the most critical at the moment.

THE number of steel orders carrying a priority rating is said to be increasing in this area and the effect of such orders is clearly visible in upsetting delivery schedules mutually agreed upon by steel producers and buyers. The amount of inconvenience caused by the priority orders is probably at this time greater than the tonnage involved, but it is expected that the number of such orders will certainly increase in the near future.

One of the tightest spots in the automobile production line at the present time is the foundry. August is always a bad month for foundry production and the available labor supply seems today to be, if such a thing is possible, even more uncertain than it has been in the past. With many foundry operating schedules cut short because of a lack of pig iron, scrap or foundry coke many workmen are getting only two to three days' work each week. Under such conditions turnover in the industry is bound to be high. At present few foundry managers know what to expect when Monday morning rolls around and operations are scheduled to be resumed. There may or may not be sufficient labor on hand; if not, there begins a mad scramble to round up sufficient help to carry out necessary operations.

The touch-and-go nature of foundry operations today is said to be unlike anything previously reported in the history of the industry. The miracle is that a sufficient number of satisfactory castings have been turned out by the unpredictable labor force that is available.

The struggle to keep foundries operating can be judged by the fact that one of the largest automobile producers is presently importing 50 pct of its pig iron requirements from Utah and Mexico. This major producer was faced with the choice of absorbing such freight charges or closing down operations entirely.

Car Registrations Low

Detroit

• • • **New passenger car registrations** for the first six months of 1946 were slightly more than 20 pct of prewar registrations according to the motor statistical div. of R. L. Polk & Co., Detroit, regular compilers of registration data for the automotive industry. Final tabulation of new passenger car registrations for the first six months of 1946 show a total of 493,309 cars registered as compared with 2,463,063 for the same period in 1941.

Registrations for 13 states for the month of July indicate that new cars titled are approximately 36 pct of the prewar figure.

Meanwhile truck registrations continue to show substantial monthly improvement. Figures from 39 states for July total 37,891 as compared with 48,398 for the same states and month in 1941.

GM Halts Preparations For Manufacture Of Chevrolet Light Car

Detroit

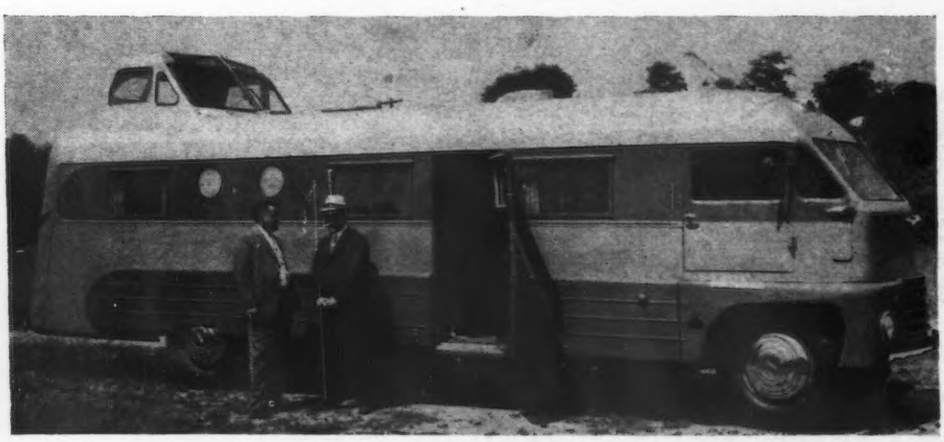
• • • **A prediction** made here last week by C. E. Wilson, president of General Motors that shortages of basic materials would result in curtailed automobile operations in the near future was substantiated when it was announced that all preparations for the manufacture of the Chevrolet light car have been stopped until the basic materials situation improves.

A subsequent statement by Nicholas Dreystadt, vice-president and general manager of the Chevrolet Div. of GM explained that the light car engineering and planning divisions will be kept intact although all construction work on the new plants at Cleveland will be halted.

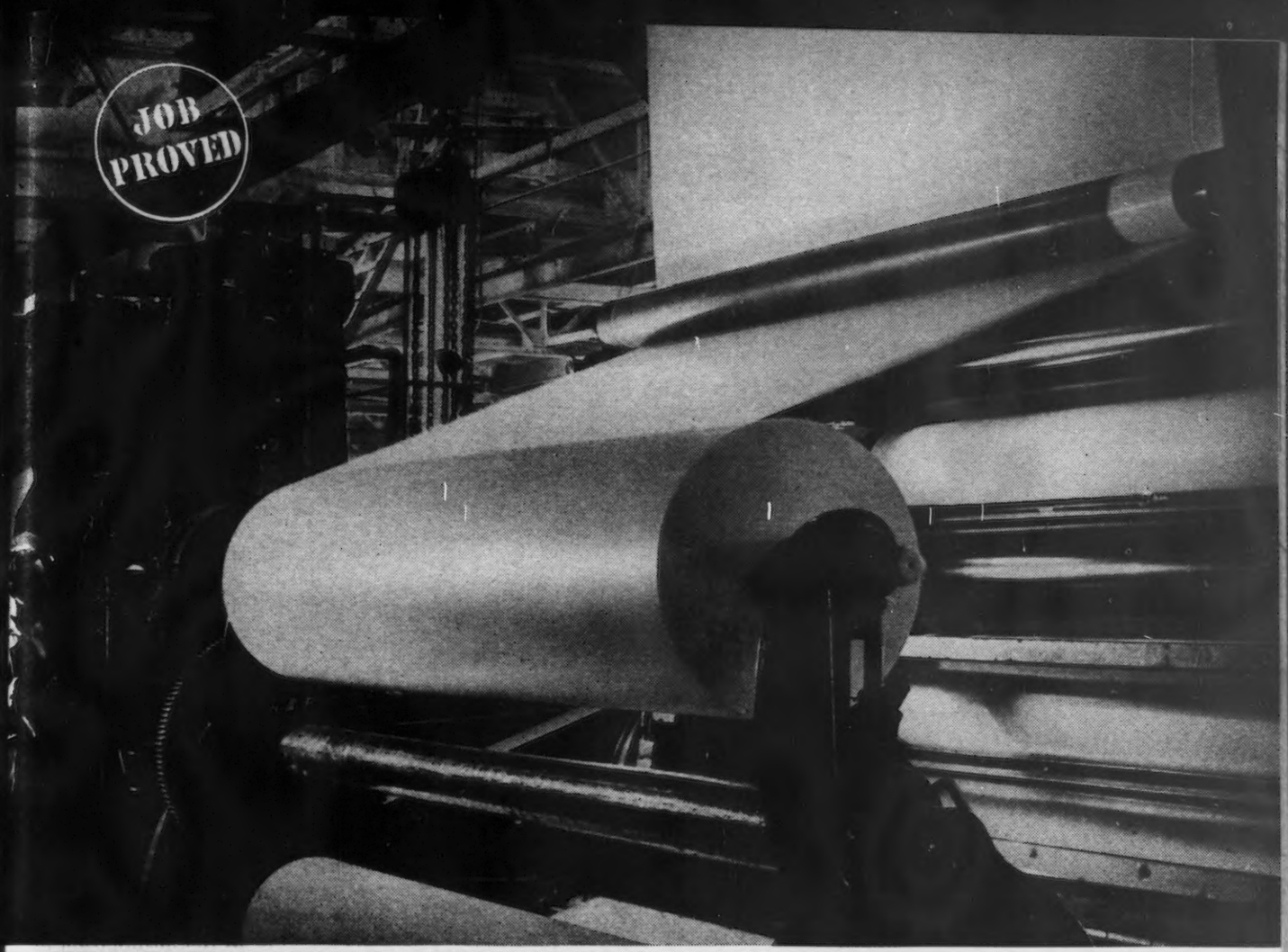
Explaining the company's decision, Mr. Wilson said:

"Because of the current shortage of basic materials such as lead, copper, pig iron and flat-rolled steel, and the uncertainty as to when they will be available in sufficient quantities to carry the schedules for models already in production, all preparations for the manufacture of the Chevrolet light car have been stopped until such time as this material situation may have been clarified."

It is also reported that operations on the Ford light car may have been halted as early as 30 days ago. When asked recently Ford officials refused either to confirm or deny that plans for introducing a Ford light car have been shelved.



NO HOTEL PROBLEM: *Dr. Henry J. Sealey of Dumont, N. J., licks the hotel room shortage with this giant home on wheels which contains four rooms and is 30 ft long. It sleeps eight and is reported to be completely air conditioned.*



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Keeps Sixty Bearings in Perfect Condition, Ends Jerky Operation

Through eight, long, hard years, the 60 bearings of a big paper-machine in a widely known mill have been running smoothly.

Not one bearing failure has interrupted production. Former troubles with jerky operation, carbon accumulations in the bearings, and dirty conditions around the machine have all been eliminated, since the mill changed to a special "Job-Proved" Sun paper-mill lubricant.

The mill superintendent says he would not use any other lubricant at any price. Sun Engineers, like the one who recommended the lubricant for this machine, are ready to serve you. They combine broad experience in petroleum technology with the specific requirements of machines.

"Job-Proved" Sun lubricants are on the job through industry, in coal mines, quarries, textile mills, paper mills, rubber plants, machine shops, power houses. To make things go smoothly, to increase production and decrease costs, call the Sun office near you. Or write . . .

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Washington . . . .

L. W. MOFFETT

• Extensive plans for modern industrial mobilization being worked out by Army-Navy munitions board . . . Strategic plants to be under ground.

WASHINGTON—As a result of extensive surveys and months of study by the Army-Navy Munitions Board, the military establishments expect to have before the end of the year the framework of a practical plan providing for rapid and efficient industrial mobilization should the United States again be thrust into another war. While the basic principles will soon be virtually completed, another year or so will be needed to iron out all the many details.

The Board has been wrestling with the problem ever since the end of the war. The Board is presently composed of three members—a civilian chairman, Richard R. Deupree, president of Proctor & Gamble; Kenneth C. Royall, Under Secretary of War; and W. John Kenney, Assistant Secretary of the Navy. The work of developing an industrial mobilization plan was a new task added to the work of the Board which previously consisted largely of coordinating procurements and other activities which jointly affected the two military services.

The program now emerging in a tangible form from a mass of statistical data is the result of months of work by a staff of about 50, composed of ranking Army and Navy officers and civilian experts. It is under the direct supervision of an executive committee headed by Mr. Deupree with Brig. Gen. S. P. Spalding and Admiral Roger W. Paine as the other members.

Work has been carried on unnoticed and without fanfare. Understandably, the Board is reluctant to discuss details of the project because some features of the program may require Congressional approval and appropriations in order to be made effective; other phases are such as to be interpreted as meaning that the Army and Navy anticipate another war in the near future. Neither wants to be accused of war-mongering.

NEVERTHELESS, both are only too well aware that the United States has always been caught unprepared, industrially as well as militarily. They know, too, that in view of the highly developed and specialized weapons and methods of modern warfare, the nation would be allowed even less time for preparation in the event of another conflict. Added to this is the knowledge that because of these specialized requirements of modern war, the time required for tooling most factories has increased instead of decreased.

Under the plan as developed so far, although kept under wraps, approximately 300 former government-owned war plants would be placed in a reserve status, that is to say, they would be sold or leased to private interests with a "recapture" clause in the contract. This special clause gives the government the right at any time within 20 yr to take over the plant in the event of an emergency. In the event the clause should be exercised, the owners or lessees would be reimbursed for any actual loss incurred.

Selection of the plants for reserve status would be made largely on the basis of time required for conversion from civilian to war production. All of them would be of the type for which conversion would require no more than from 60 to 120 days. In many cases, machinery and tools used during the war would be removed and stored after proper preservative measures had been taken.

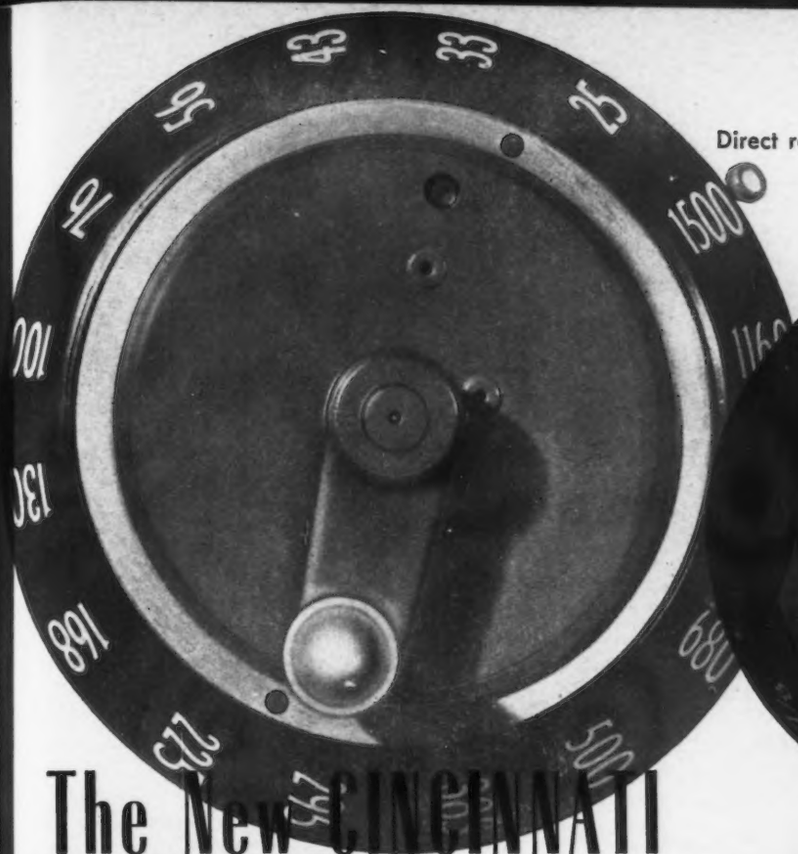
The Army Air Force has already taken steps looking to the preservation of machinery and tools peculiar to its individual needs. It alone plans to remove and store upwards of 35,000 machine tools from aircraft plants which have been or are to be declared surplus to WAA for sale or lease. Ordnance and other arms of the service have similar plans but no figures are available as to the extent of their individual programs.

IN SOME instances, the purchaser or lessee of a plant designated as a reserve facility would also agree to set aside a part of the plant and its facilities to be held on an inoperative basis for the military. In such cases, the machinery would not be removed but would be oiled, greased and otherwise given protection against damage or deterioration.

In addition to the designation of plants under a reserve classification, the Board is also selecting a smaller number of plants and facilities to be placed in a "stand-by" category. These will be largely arsenals and such facilities as shell-loading plants which would be maintained in first class condition, although inoperative. Thus, they would be ready for production almost as quickly as operating personnel could be obtained.

Planning by the Munitions Board goes much further than mere designation of surface war plants for a reserve and stand-by status. It also involves a thorough survey of existing and potential underground areas. (THE IRON AGE, June 13, p 134). Working under the direction of the Board for months Army Engineers have been cataloguing, charting, and grading according to their characteristics both natural caverns and man-made caves such as mines.

Among the characteristics particularly taken into account and recorded have been floor space, ceilings, humidity, soil and rock conditions, overhead cover and access approaches. Other important aspects studied included the extent of con-



The New CINCINNATI NO. 2 MI offers an unusually wide range of SPEEDS and FEEDS

SPEEDS 25 TO 1500 R.P.M.

FEEDS ¼" TO 30"

Changing speeds and feeds on the new CINCINNATI No. 2 MI Milling Machine is easy and quick—a half turn of the crank on either dial is all that's necessary.

The new CINCINNATI No. 2 MI Millers are available in Plain, Universal and Vertical styles. Complete engineering specifications are contained in catalog M-1429-1.

● The new CINCINNATI No. 2 MI Milling Machine has sixteen spindle speeds—25 to 1500 r.p.m. (60 to 1 ratio)—offering top efficiency in milling operations on parts made of various grades of steel, cast iron, aluminum and bronze, using cutters ranging from face mills to small end mills . . . for high speed carbide milling as well as operations employing conventional high speed steel cutters. Selection of the next increment of speed is easily and quickly made by a half turn of a single crank on the speed dial. ¶ Then there are sixteen feeds, ¼" to 30" per minute (120 to 1 ratio). Here, too, the proper feed is quickly selected from operator's normal working position by rotating a single crank at center of feed dial. ¶ And there are many other features built into the new CINCINNATI No. 2 MI Miller—features that are extremely important to shops requiring the versatility of knee-and-column type millers for producing small- to medium-sized parts. Details on all features and their benefits may be obtained by writing for catalog M-1429-1.

THE CINCINNATI MILLING MACHINE CO.

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cealment from aerial observation as well as proximity of sites to transportation, communication and public utility facilities. Careful estimates of construction and alteration costs will be worked out and submitted with recommendations.

WHILE the ostensible purpose of the survey was to locate and determine potential underground sites for long-term storage of machinery and tools, the Army has made no secret of its apprehensions as to the vulnerability of the nation's surface-based industrial facilities in the event of future wars. Many ranking Army officers admit freely in off-the-record discussions that they believe industry would have to go underground should this nation be attacked.

The Board's plan will recommend also a broad and comprehensive program for research and development. Already the armed forces are spending as much for this purpose as their budgets will permit. For the current fiscal year, the War Dept. alone is investing upwards of $280 million for this activity. The Army will spend the largest amount by far, about $185 million, for aerial research and development. Another $80 million will be expended by the Ordnance and Chemical Warfare Services largely for armament and munitions research. Of necessity the armed forces will confine its activities to purely military aspects; the Board would recommend delving deeply into industrial research so far as it might possibly apply to war production.

In direct opposition to recommendations of Commerce Secretary Wallace to the effect that all production of synthetic rubber should be closed down in the interests of foreign commerce, the Board is known to favor continued research and development in this field, together with the operation of one or more small plants with facilities which could be readily expanded to produce an output of at least 600,000 tons annually on short notice.

INDUSTRY has advised the Board that unless a production of 250,000 tons were allowed, operation of such a plant or plants would be virtually valueless as well as impractical.

In general, the Board's plan is in line with recommendations made by the Mead Special Senate Committee in a report released Sept. 3. Concerning industrial mobilization planning it said, in part:

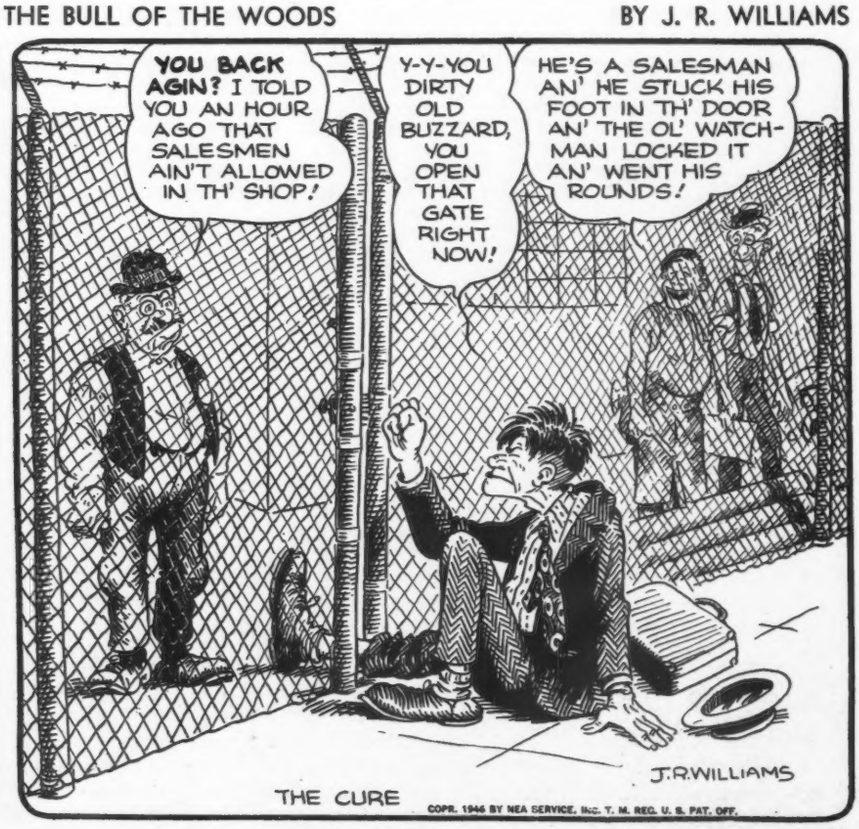
"An industrial mobilization plan should provide for the mobilization of every facility needed to keep our intricate industrial machine in operation . . . it takes great amounts of time to plan and develop new weapons and materials to build and test prototypes and to plan and install the machinery necessary to manufacture such prototypes if and when required . . . if that is done and sufficient war material is manufactured to equip test units so that strengths and weaknesses can be tested in actual field practices we will be able to make a worthwhile industrial mobilization plan for the immediate conversion of industry from peacetime to war production."

Naturally, there is considerable speculation as to the cost of a practical plan for industrial mobilization but this must remain a matter of conjecture until the program is rounded out in detail. Officials connected with the Board's project refrain from comment along this line although they feel that a cost of $4 billion annually, as estimated by some sources, is a little high.

They point out that this amount is the equivalent of 40 pct of this year's combined Army-Navy budget which is already feeling the effects of the Administration's pruning knife. Only a portion of the cost, however, would be charged directly to the military budgets, as such.

For instance, part of the overall industrial mobilization plan involves stockpiling of critical and strategic materials for national defense. This alone will cost $1.8 billion over a 5-yr period or $360 million annually; this appropriation, however, is already provided for through Congressional statute, independent of future appropriations for either the Army or Navy.

THE BULL OF THE WOODS — BY J. R. WILLIAMS


YOU BACK AGIN? I TOLD YOU AN HOUR AGO THAT SALESMEN AIN'T ALLOWED IN TH' SHOP!
Y-Y-YOU DIRTY OLD BUZZARD, YOU OPEN THAT GATE RIGHT NOW!
HE'S A SALESMAN AN' HE STUCK HIS FOOT IN TH' DOOR AN' THE OL' WATCHMAN LOCKED IT AN' WENT HIS ROUNDS!
J.R.WILLIAMS
THE CURE
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Machine Tools on Sale

Washington

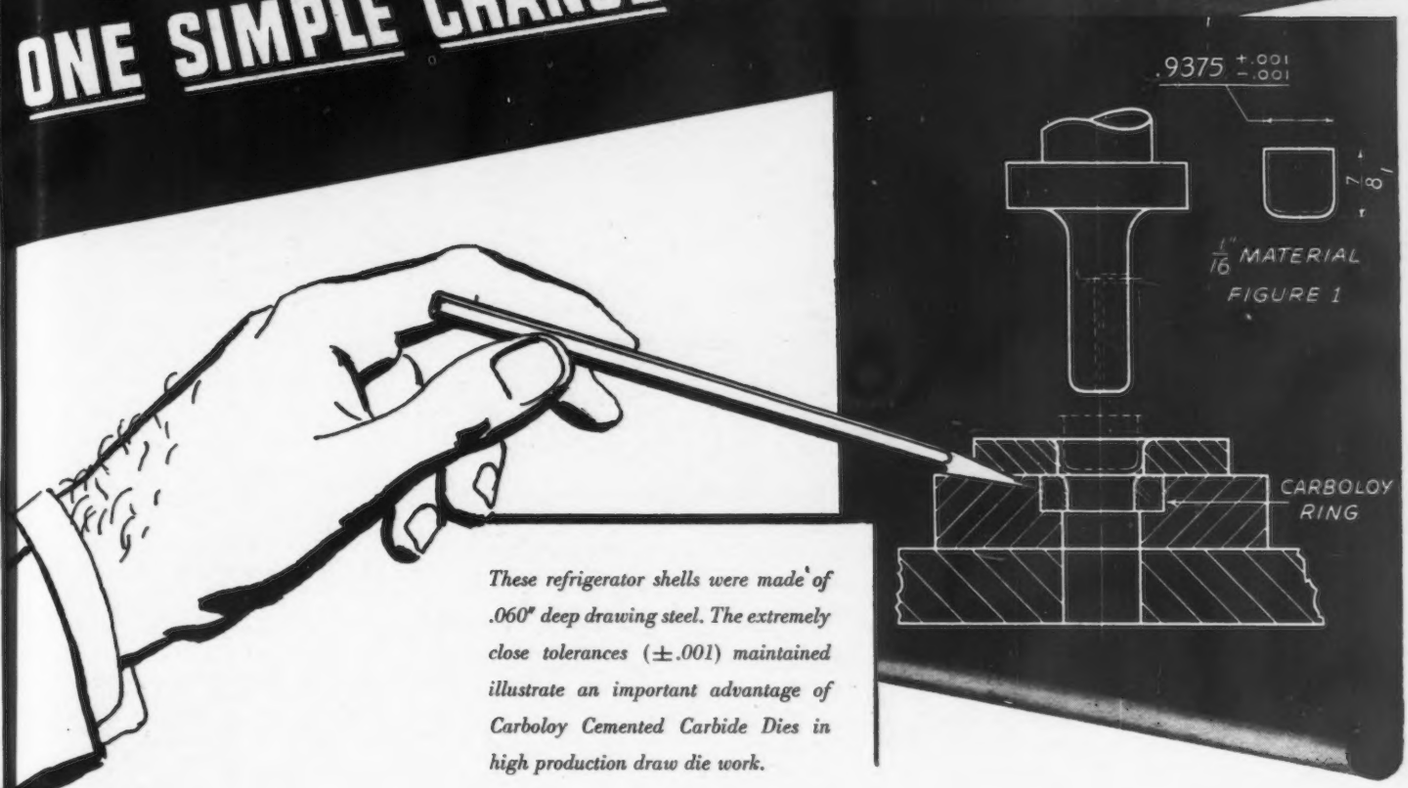
• • • WAA has placed on sale to the general public at Buffalo, $33 million worth of machine tools. No priorities are needed since all items had previously been offered to priority claimants.

Included in the items were lathes, grinders, drills, boring machines, vertical mills, polishers, gear shapers, tanks, testers, etc. Fixed prices have been placed on all items offered.

30,000 PARTS PER DIE POLISH VS.

500,000

ONE SIMPLE CHANGE BRINGS RESULTS LIKE THIS



These refrigerator shells were made of .060" deep drawing steel. The extremely close tolerances (±.001) maintained illustrate an important advantage of Carboloy Cemented Carbide Dies in high production draw die work.

Looking for ways to improve your production? Here's an example of what Carboloy Cemented Carbide Dies will do in *your* plant:

A manufacturer of steel refrigerator shells, using top-quality steel dies, was getting a maximum of 30,000 parts between die polishings. Then he changed to Carboloy Cemented Carbide Dies. Production between polishings soared to 500,000 parts!

Long die life is only one of the many important advantages Carboloy Cemented Carbide Dies brings to your Cupping, Blanking and Drawing operations. Users consistently report closer tolerances on drawn parts—fewer "rejects"—lower cost per piece—virtually mirror-smooth surface finish, with big reductions in buffing time—and sizeable boosts in output-per-press.

For better production, at lower cost, change to Carboloy Cemented Carbide Dies. And for more complete information on how Carboloy Cemented Carbide Sheet Metal Dies can help you, take advantage of the many production-improving ideas contained in our Booklet D-120. Write for your copy today.

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SHEET METAL DRAWING AND BLANKING DIES

INCREASE OUTPUT

EXTEND DIE LIFE

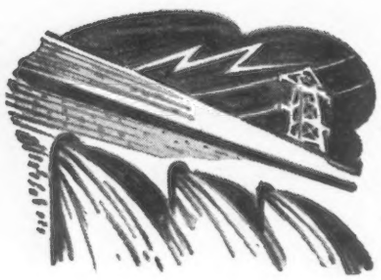
HOLD CLOSE TOLERANCE

REDUCE "REJECTS"

West Coast...

ROBERT T. REINHARDT

• Metal Trades Manufacturers of southern California protest handicap of high labor costs and ask for reduction in rates to meet competition from other areas.



LOS ANGELES—West Coast industry has long cried out for all to hear that it is suffering under the lash of "eastern discrimination"—the whip of higher prices for raw materials or partially manufactured goods "west of the Rockies" and alleged limitations of materials in favor of eastern manufacturers has cut some festering welts across the straining backs of embryonic western industries.

To the list of "discriminations" is now added the unkindest cut of all—"labor on the West Coast is imposing an 11 pct penalty on manufacturers trying to compete with eastern and midwest producers."

This is the gist of the charges aired by Eltinge T. Brown, manager of the Metal Trades Manufacturers Assn. of Southern California. In a release titled, "Southern California Industrial Economy Threatened," the association says:

"The metal trades industries on the Pacific Coast cannot continue to pay the highest wage rates in the entire United States, and at the same time accept a deliberate slowdown of production, if they hope to survive.

"Sane American labor leadership, like sane employer leadership, wants good wages, decent working conditions, homes, family life, churches, schools, pleasures. These factors constitute security and happiness in the American way of life. But both labor and management know there is no security in a job if the job itself is threatened with collapse. Collapse of jobs and security will surely come to our Pacific Coast states unless the present labor costs are quickly brought down to an equitable basis.

"OF course there are some groups here in the United States who would welcome industrial chaos and high unemployment. Collapse of jobs and security for workers would fit nicely into their plans and hopes. Even certain labor organizations, with their alleged communist-facist philosophies, may be promoting this very thing. However, the program of the reportedly communist-guided CIO-PAC and the faults and frailties of the more conservative (but in some instances, just as selfish and grasping) American Federation of Labor, are not subjects to be treated at this time.

"If we are to be realistic here on the Coast; if we are willing to remove all false fronts; if we are to meet the issues without fear—then we must move immediately toward the goal of reducing our labor costs and increasing our present low rate of productivity. On the latter point, there is no proof that West Coast production workers sincerely desire to increase their current rate of output. Again it is not a subject for treatment here as to whether or not this refusal to produce—even with the highest hourly earnings in the United States—is being used as a threat or lever to gain even more money through incentives, bonuses or guaranteed annual wage programs, etc.

"It is one thing to counsel or advise without any basis in fact for so doing; it is another thing to examine factual data and then reach a conclusive recommendation. This report, therefore, comes only after a thorough study of facts—and all recommendations are based on those facts.

"FIRST it might be well to treat a subject which forms the major premise on which demands for high wage rates are based, viz. —'Cost of Living.' It is true that it costs more to live today than it did in 1939 or 1941. It actually costs 39.4 pct more to live in Los Angeles now than it cost in January 1941. (U. S. Dept. of Labor Bureau of Labor Statistics, Consumers' Price Index for July 15, 1946.) Seattle, Portland and San Francisco range even higher than Los Angeles.

"But what about high wage rates? How high are they, and what is the true picture of the relationship between living costs and average hourly earnings?

"The increase in average hourly earnings in Los Angeles from January 1941 to June 1946 were as follows:

	Jan., 1941, Cents	June, 1946, Cents	Per Cent Increase
Machine shops	82.3	128.3	55.9
Gray iron foundries	70.4	116.0	64.8
Steel foundries	73.2	120.2	64.2
Nonferrous foundries	78.2	113.6	45.3
Fabricated structural steel	89.0	122.9	38.1
Industry average	78.6	123.8	57.5

"Compare the industrywide average increase in average hourly earnings to the increased cost of living from January 1941 to June 1946 and it is obvious that the increases in earnings are still far ahead of increases in living costs. Indeed, Los Angeles shows 57.5 pct increase in overall hourly earnings as against but 39.4 pct in overall living costs. It is time to forget the arguments that because milk goes up 5c per quart, or bread increases 2c per loaf, or butter is 12c more per lb, that wage rates must be increased 15c or 18½c per hr. The facts remain—our average earnings in the metal trades of Los Angeles are 18.1 pct higher than the increases in costs of living since January 1941. Also, our wage rates throughout the Pacific Coast are from 11 pct to 57 pct higher than anywhere else in the United States. So much for this false theory regarding high living costs among production workers.

"Let's look at the distribution of

IT'S EASIER

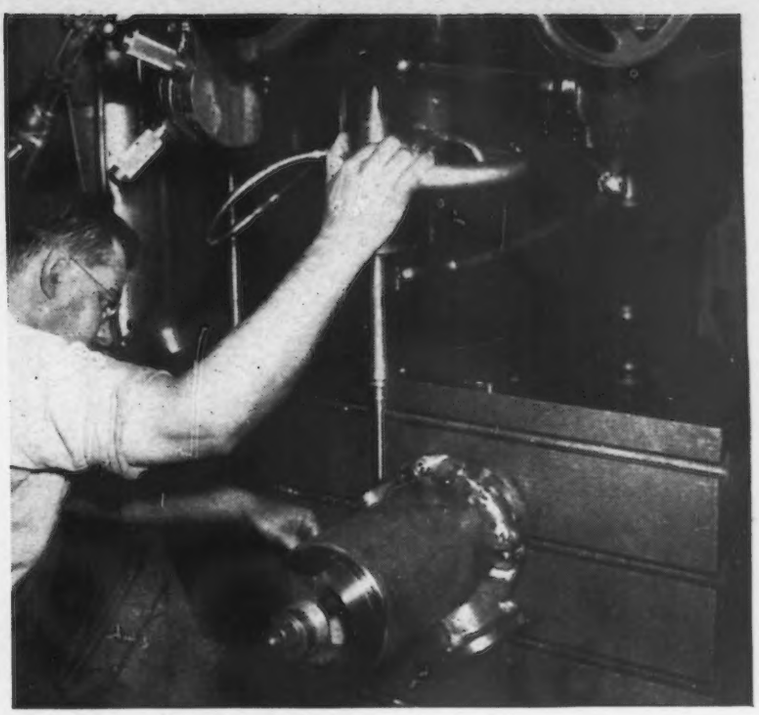
to make

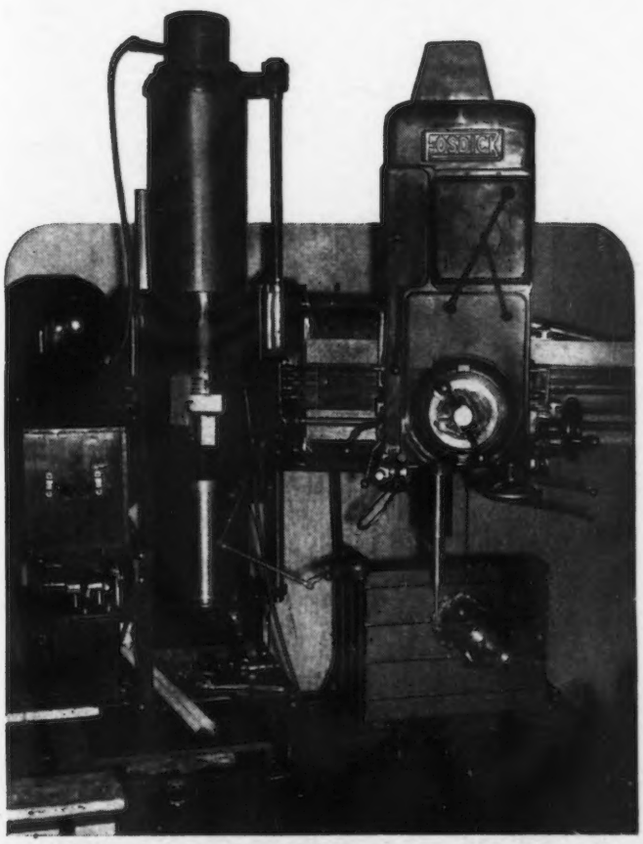
PRODUCTION QUOTAS

with

FOSDICK

Hydraulic RADIALS.





Outside of the natural flexibility of a Radial, you'll find the hydraulic control on the Fosdick makes it easier to operate—quick and positive as to control—and foolproof.

For example the hydraulic control simplifies mechanical functions and produces ease of movement. Hydraulic column clamp, operated from the head, is simple and foolproof. Interlocking lever for unclamping, raising and lowering the arm eliminates necessity for two levers and possibility of operator forgetting to clamp arm when drilling. All controls at operator's fingertips.

Thirty-six spindle speeds and eighteen feeds are provided on all sizes.

If you want greater production and lower costs on your radial drill work specify Fosdick Hydraulic Radial for your next job.

Complete construction and design details with specifications on all sizes are furnished in Fosdick Radial Bulletin R.D.I. *Write for yours.*

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, ··· OHIO

plant workers on the basis of wage rates being paid. The Bureau of Labor Statistics (Wage Structure, Series 2, Nos. 1 to 8) reports this distribution on a basis of percentage according to three groupings, viz., those receiving less than $1.00 per hr, those from $1.00 to $1.999 per hr, and those receiving $2.00 and over. Here is the comparison:

Percentage of Workers According To Range of Average Hourly Earnings

	Entire Industry—By Regions		
	Per Cent Under $1.00	Per Cent $1.00-$1.999	Per Cent $2.00-Over
Southeast	76.8	23.2	..
Middle West	72.7	25.7	1.6
Mountain States	70.4	29.6	..
Southwest	65.5	34.5	..
Border States	64.9	34.8	.3
New England	58.0	41.4	.6
Middle Atlantic	57.6	39.4	3.0
Great Lakes	51.1	47.0	1.9
Pacific	24.5	74.5	1.0
United States	50.8	47.4	1.8

"THUS we find the metal trades industries on the Pacific Coast paying 74.5 pct of their workers between $1.00 and $2.00 per hr; only 24.5 pct are receiving less than $1.00 per hr. Yet the next highest area in the country—the Great Lakes States — shows only 47.0 pct of their workers receiving $1.00 to $2.00, and 51.1 pct being paid less that $1.00 per hr. Other competitive areas, i.e., the Middle Atlantic and the New England States, show 39.4 pct and 41.4 pct respectively as being from $1.00 to $2.00 per hr, with 57.6 pct and 58.0 pct falling less than $1.00. The Pacific Coast is 27.1 pct higher than the average for the country in the number of workers receiving $1.00 to $2.00 per hr, and 26.3 pct below the U. S. average for the number working for less than $1.00 per hr. How can we compete unless the Coast brings itself at least into line with the next highest area?

"We have stated that the average hourly earnings in the Pacific Coast are the highest in the entire United States. Again turning to BLS reports (Wage Structure, Series 2, Nos. 1 to 8) the accompanying tabulation clearly shows the relation borne by the Coast to the other areas of the nation.

"There isn't an employer on this Coast who doesn't desire all workers to live and live well. At the same time every employer has the right to expect workers to EARN their pay. To demand and receive the highest wage rates known in history is one thing; to EARN the money is another.

"So, no matter how we view the problem, it is apparent that the Pacific Coast is badly out of line with the rest of the country. We are now entering a highly competitive industrial period. The honeymoon of government contracts, when unfortunately, little thought was given to costs, is over. New industries are looking at this Coast with a view to coming in. Eastern competitors are studying our local conditions with plans for entering our markets with eastern-produced merchandise. The success or failure of our present and future manufacturing plants will depend upon how those plants meet the competition of local, national and foreign producers.

"EVERY pound of steel must be transported from the East at already high freight rates. These rates probably will be increased even more. The Southwest, with labor costs much less than Eastern, Middle Atlantic or Great Lakes States (BLS indicates average hourly earnings less than 90¢), may be expected to pour their finished products into the West Coast's markets at prices much lower than the Coast itself can afford to sell them. This merchandise will be no higher in quality than our own West Coast merchandise, nor will the service on it be any better, but the costs of producing it will be so much lower that we cannot compete in price without removing entirely our already narrow profit margins. We'll all cry and yell—organized labor will join with management in condemning this 'foreign' competition—but the show will go on just the same, and many of our local producers will disappear from the industrial scene forever.

"One answer to the whole problem can be found if the metal trades industries on the West Coast are placed at least on the same hourly earnings basis as the next nearest area, viz.—the Great Lakes States. This means that the metal trades manufacturers up and down the Pacific Coast should immediately seek an overall wage reduction of 11 pct. Such relief, of course, can come only through official action of Regional Offices of the government's Wage Stabilization Board.

"Our Coast must have relief from the present dilemma if management is to have anything left to manage and if the worker is to have a job."

Percentage Relationship—Pacific States to Other Regions By Average Hourly Earnings

	Iron and Steel Foundries Pct	Ferrous Foundries Pct	Non-ferrous Foundries Pct	Fabricated Structural Steel Pct	Machinery Pct	Machine Tool Access. Pct	Sheet Metal Pct	Average Entire Industry Pct
Southeast	.....	+60.3	+47.4	+45.1	+50.7	.....	+98.5	+57.1
Middle West	.....	+28.2	+27.3	+36.8	+29.5	+75.9	+58.8	+37.5
Southwest	.....	+43.4	+38.3	+43.4	+25.3	+28.1	+53.4	+36.0
Border States	.....	+29.8	+19.1	+33.3	+39.0	.....	+10.6	+33.0
Mountain States	.....	+23.9	+33.3	.....	+22.6	.....	.....	+37.5
New England	+19.1	+16.5	+ 9.8	+14.4	+22.6	+46.0	+26.2	+22.2
Middle Atlantic	+18.3	+10.1	+16.5	+20.2	+17.5	+46.0	+ 8.9	+18.6
Great Lakes	+ 5.3	+ 4.8	+ 4.7	+21.4	+14.0	+28.1	+36.4	+11.0
United States	+ 9.7	+ 9.0	+ 8.7	+22.7	+16.2	+35.2	+27.4	+15.2

Outlines Program For Western Metal Show

Cleveland

• • • **Preliminary plans** for resumption of the Western Metal Congress and Exposition have been completed and the event will be held in the San Francisco-Oakland Golden Gate area for six days beginning March 22, 1947. The last such event was held in Los Angeles in 1941.

W. H. Eisenman, managing director of the Congress and Exposition, stated that the two Oakland Civic Auditoriums will be the scene of the fifth such gathering after the lapse occasioned by the war.

The Western Metal Congress and Exposition will again be sponsored by the American Society for Metals and will have the active cooperation of West Coast chapters of the nation's leading technical societies.

Technical programs of the Western Metal Congress will include lecture courses, technical papers and round table conferences of special interest to the metals, aviation, petroleum, chemical, mining and general manufacturing industries. Further announcements of this program will be made at a later date.

Steel . . . in 150-ton prescriptions!

These great coiled ribbons of steel — gleaming bright after their long trip through the Armco mills — are getting a final "double-check." They're almost ready to go!

Days before in the Armco laboratories, this steel started out as a *special prescription.* The customer told us what qualities he needed for his products — smooth finish, strength, serviceability. And we prescribed the mill processing to make the kind of steel that would do the job.

INDIVIDUAL ROUTINGS

At Armco every mill-order travels on an individual "ticket." The routing may call for less annealing, a bit more temper rolling, a different sequence of operations as the steel travels through the mill . . . any one of a hundred or more possible routings.

Individual treatment of orders is only one of many Armco methods that help manufacturers produce more attractive sheet steel products for home and industry. Out of Armco research came such special-purpose sheets as the new ARMCO Aluminized Steel, ARMCO Enameling Iron, ZINCGRIP, Galvanized PAINTGRIP, thin-gage electrical steels, and special grades of stainless steel.

Research has made Armco the leader in the field of special-quality sheet steels. Armco research, manufacturing skill and product development are always searching ahead . . . improving sheet steels for finished products that will serve well, last longer, and look better. The American Rolling Mill Co., 2921 Curtis St., Middletown, Ohio.

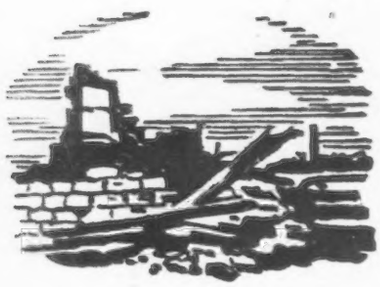
SPECIAL PURPOSE ★ ARMCO ★ SHEET STEELS

THE AMERICAN ROLLING MILL COMPANY

European Letter

JACK R. HIGHT

• European travel beats Barnum for fun . . . Dollar "instrument" becomes king as Occupation mark now virtually useless.



MILAN, ITALY — The wear and tear of traveling in Europe sometimes wears me down enough that I am tempted to write a gripe letter explaining how complex life over here can really be. My meanderings are not simplified by the fact that I am something of a dual personality. When I go into Germany, and certain parts of Italy, I am answerable to the Army as an "accredited correspondent." On all other occasions I am Joe Doe, except blessed with embassy airplane priorities, which are available to virtually every business man over here today.

The recent trip has been interesting enough from a sheer physical standpoint that I feel that I need to get it off my chest. The preparations started early in June in London, when my faithful office servant started making the rounds with my passport and my army credentials. To combine a visit to Germany and Italy in a single crossing requires among other things the following: Passport validations (easy in this case with army credentials), a visa for Italy, an identification card from the Adjutant General's Dept. for Germany (hardly fair to list as I had been carrying this already), transit visas for Switzerland and France, transport priorities from the American Embassy, and a re-entry permit from the British Home Office to get back to the London office.

After the official problems had been gradually dissolved there remained the matter of currency. When this is available to an American in dollars there is practically no trouble at all, but when my funds are tied up in a sterling account, clear the decks for red tape and delays. What with block long queues, and understaffed offices, and general confusion, almost every one of these operations took at least one full day, and most of them eventually three or four.

When, after plans were laboriously made, it became impossible for me to leave in time to go to Italy and then to Germany, I decided to reverse the procedure. Having stated blandly on the embassy's priority form that I must be in Rome on the specified date, I now blithely phoned them that I was awfully sorry, but I just could not make it. The only reason actually that I reversed my order on the trip was that British public relations officials for Germany had offered overwhelmingly elaborate plans, with a detailed itinerary which I hated to upset.

ONLY a few days late I started to revise my plans to move direct from London to Berlin, where I had a little work to do before moving into the British zone. Fortunately the Royal Air Force Transport Command has a direct flight to Berlin, and this facility was offered to me. I collected my official British Army travel orders, and went to the passport office to determine whether or not I needed a military permit. I do not know for sure just what a military permit is, I have never seen one, but the public relations officer thought I should have it. The outcome, after proving that I was legitimate both as army and as civilian, was that I would not need it if I got out of Germany before Aug. 1.

I was then about ready and the trip into Berlin was uneventful. I stated rather inaccurately above that it was a direct flight. Actually we stopped at four o'clock with the rest of the British Empire, and had an hour and a half tea interval in Hamburg. Despite some confusion in the British headquarters in Berlin as to my exact plans, the sojourn from the time I left Berlin until I finished in Aachen was among my less worrisome periods. The British Army put at my disposal a Volkswagen, German driver, and a conducting officer, all of whom did well by me. The Volkswagen is becoming as integral part of the British occupation as the jeep was to the campaign itself.

With a car and access to the British refueling and repair services, travel in the Ruhr was simple. We started off as early as we liked with our lunch in a haversack, and returned to our base when our stomachs moved us.

But as soon as I left the Volkswagen, my troubles began. The conducting officer left me in Cologne shortly after noon in the hands of a railway transport officer in the station. He had already recommended a train 2 hr later to Mainz as the best prospect for getting to Frankfurt that night. I had received my American orders to proceed to Frankfurt, at first on the supposition that I would hitchhike on the autobahn, but I ended up the week with a little too much luggage for such an operation. The German civilian train arrived in Mainz, across the Rhine in the French zone of occupation, and less than 50 miles from the comfortable American press camp in Frankfurt, at about dark.

Naturally there was not another train to Frankfurt that night, although if I could ride the streetcar across town and walk across the Bailey bridge, I might get one from the American zone. My luggage served as a good excuse again, and I declined. In the meantime I was mentally planning my movement to Rome. Orders were already cut in Frankfurt to go to Paris from whence I planned to fly to Rome and then Milan. Shortly after I arrived the nightly army sleeper from Frankfurt to Paris went through the Mainz station with a 4 min stop.

THIS was my big chance. If I could talk my way on it, I would be in Paris the next morning, and still have a chance of making Rome that day. Carrying all my bags on one arm, and a fistful of identity cards, orders, and a pass-

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port in the other fist, I cheerfully dashed up to the train commander for a short argument.

It was very short:

"Show me your orders that read proceed to Paris."

"Well, you see, they are in Frankfurt, but Paris is outside the military zone, and I am an authorized civilian with proper visas when we leave Germany."

"No soap, this is a duty train, and you have to have orders to get on it. Besides that, you have to pay by money order in advance. Suggest you wait here on the platform for the leave train. It follows us through in the night, and you might talk your way onto it. It gets to Paris some time tomorrow afternoon."

I gave up, and accepted the hospitality of the Croix Rouge Francaise for the night. I caught the troop train in the opposite direction the next morning to Frankfurt, struggled into the Press camp, and started out to book my passage to Paris. I had been trying for weeks in London to find out a good way to get from Italy to Germany, and then conversely in the opposite direction when my plans changed. All of the army officials suggested that I would have to make the journey by air via Paris, or by train through Switzerland at a considerable loss of time.

THE British authorities had a service through Vienna via Berlin, but that seemed to be the hard way, so I declined. When I got into the army booking office in Frankfurt, I made plans to leave in the afternoon for Paris, without delay. Being early on a Sunday morning, there was only one other passenger present, so the booking operation only took about half an hour. As I went out, in deference to the army system of presenting orders personally to book any flight, I suggested shyly, "There isn't any possibility that you could call Paris and book me out of there to Rome for tomorrow? I know it is against the rules, but it would save me a day."

It was at this point that I was bowled over by the young fraulein behind the desk, "My guteness, vy don't you fly right to Rome. You know ve got a direct flight effry day."

I sat down and caught my breath, and quickly changed my plans. I asked no questions about why they kept the schedule such a secret that no one else in Europe knew about it, but just snatched the chance. Naturally, I did not have any orders reading Rome, but I did have an embassy travel priority from London that read Rome among other places, so I traveled on the strength of that. I am not sure whether that was strictly permissible or not, but I will know the next time I want to go to Germany.

THE whole U. S. Army has adopted a rigid "pay-as-you-go" system in Germany, particularly insofar as correspondents are concerned, and it is getting so deep that it is difficult not to trip in the red tape. The effort is directed at making all payments in dollars or some kind of dollar instruments, but it does not fit well for a man who is making infrequent trips into the zone, as I do. I was in no way equipped to pay dollars on this trip, and met with one awkward situation after another. One of the amusing aspects of the dollar clamp down, is that at each airplane stop, there is a ground crew man who comes through the plane and signs your ticket, just like a conductor punching it on a train. There is some vague explanation of this procedure, but I am afraid my mind was so unfettered that I did not quite grasp its significance.

The arrival in Rome put me once more outside military jurisdiction and made me once more able to operate on my own. Despite a lack of prior arrangements, the hotel space problem, usually so vexing, I solved without too much trouble, but transportation in the city remains difficult. From the standpoint of food, as an American living in hotels, I had opportunity to eat better in Italy than in London, but after the mild summer of London and the unseasonable rain and cold of the Ruhr I found the heat almost unbearable.

The only difficulty that I experienced in getting out of Rome was in obtaining additional copies of my embassy priority certificate for air travel. Such certificates are rather new to the army air transport services and any system of the governments that is new is of course chaotic. Under military jurisdiction a man travels on military orders and starts his trip with several copies in hand. Every time that he is given transport the issuing officer filches a copy of the orders.

If one runs out of copies, the last man types a sheaf of new ones, certifies them as true copies, and sends you on your way with them. On the priority slips the army officials are just as anxious to retain copies as their authorization to act. With three copies of a priority to cover a six leg flight, I ran out in Rome and asked the embassy to make some additional copies for me. The idea was quite out of order. I went to the press attache, got a letter of recommendation for a new priority to make the round trip from Rome to Milan, and he suggested that I not confuse the issue by trying to get the return to London on the same request. The girl only made me out a one way priority, leaving me stuck in Milan to get another new one, but I fooled them. I have a train reservation to Paris. I wonder what they think of that.

Development of New Color Film Announced

Rochester, N. Y.

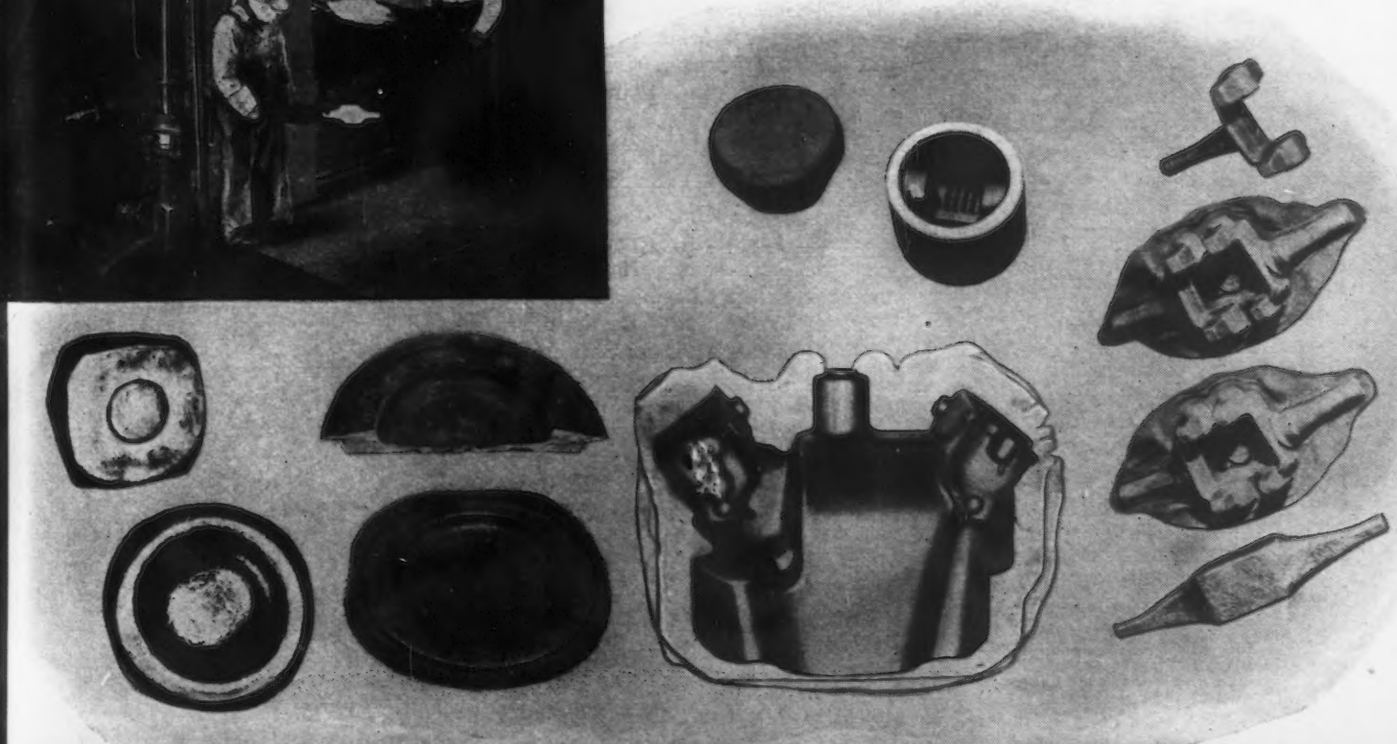
• • • **A new color film,** known as Ektachrome, which can be processed by a photographer in his own darkroom has been announced by Eastman Kodak Co. Developed during the war for the armed forces, this film is expected to remove one of the chief disadvantages of industrial use of color film by eliminating the time lag due to the necessity in the past of shipping color film to Rochester for processing. Metallurgists interested in color photomicrography have expressed considerable interest in this latest development for it permits examination of the micrograph shortly after it is taken, rather than weeks later as has been the case in the past.

Eastman Kodak reports that developers used with Ektachrome processing are as safe to handle as ordinary black-and-white developer and, in fact, are less likely to cause skin irritation than the most widely used black-and-white developers. Available in all present Kodachrome sheet film sizes and in types for both artificial and daylight illumination, the new film requires only 90 min for complete development.

AJAX High Speed Forging Presses So Efficient in the Production of Automotive and Airplane Forgings

AJAX High Speed Forging Presses have proved so advantageous in the production of strong, accurate forgings to meet the unprecedented demands for automotive and airplane forgings, that the field of forgings being produced on these presses is rapidly expanding. Just as steering knuckles, steering knuckle support shafts, ring gears, pistons and even airplane cylinder heads are being forged at high production speeds and low cost, so can a great group of other parts in these and other industries be press forged with the same degree of accuracy and efficiency.

Write for Bulletin No. 75



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PERSONALS

WALTER B. BRIGGS, general manager, Power Transmission Div., Lovejoy Flexible Coupling Co.

• **Walter B. Briggs,** formerly manager of the Power Transmission Div. of Ideal Industries, Inc., has been appointed general manager, Power Transmission Div. of Lovejoy Flexible Coupling Co., Chicago.

• **J. Paul Carroll** has been appointed advertising manager of American Brake Shoe Co., New York. He has been with Brake Shoe since 1943.

• **Ralph Livsey,** for 28 yr with the Berger Mfg. Div. of Republic Steel Corp. and for a number of those years manager of special product sales, has recently been appointed manager, Air Control Div., the Gordon Armstrong Co., Cleveland.

• **I. A. Crawford** has become associated with the Ex-Cell-O Steel Products Co., Detroit, as vice-president in charge of operations. Mr. Crawford has several years of experience as welding engineer, research development engineer and manufacturing engineer with such organizations as Chrysler, Westinghouse, Progressive Welding Co., and others.

• **J. W. LeRoy** has been appointed manager of special products sales for Berger Mfg. Div., Republic Steel Corp., in Canton, Ohio.

o o o

• **Carl W. Meyers** has been elected president of the Colorado Fuel & Iron Corp., Denver. He succeeds **E. Perry Holder,** who resigned, but who will remain a member of the board and of the executive committee. Mr. Meyers was formerly district manager of the Massillon, Ohio district of Republic Steel Corp.

• **J. S. Fluor, Jr.,** executive vice-president and general manager of the Fluor Corp., Ltd., Los Angeles, has resigned.

• **J. P. Martel** has been appointed manager of the Design Div., engineering dept., of E. I. du Pont de Nemours & Co., Wilmington, Del., to succeed **Melvin F. Wood,** recently appointed assistant chief engineer of the company. **F. W. Pardee, Jr.** has been named assistant manager of the Design Div., and **R. P. Genereaux,** assistant to Mr. Pardee on special assignment. Mr. Martel has been assistant manager of the division, and Messrs. Pardee and Genereaux have been supervising engineers in the division.

• **I. R. Mockrin,** former research engineer with Battelle Memorial Institute, and **W. A. Blum,** recently with the Tennessee Valley Authority, have accepted appointments to the research and development dept. of Pennsylvania Salt Mfg. Co., Philadelphia. Other additions to the technical staff at Pennsalt's Whitemarsh Research Laboratories include: **W. A. Millsaps,** formerly with Chemical Warfare Service, Edgewood Arsenal, Md.; **A. J. Baldi;** and **Miss A. L. Nicholson,** former librarian, development dept., Naugatuck Chemical Div., U. S. Rubber Co.

• **A. C. Haskell, Jr.** has been employed by Titanium Alloy Mfg. Co., Niagara Falls, N. Y., as associate metallurgist. Mr. Haskell will be engaged in work in the division of process metallurgy.

• **George C. Reid,** veteran melter with the Bethlehem Pacific Coast Steel Corp., has retired after 27 yr of service with the company and its predecessor, the Pacific Coast Steel Co. **Robert W. Barker** has retired as manager of accounts payable and receivable after 39 yr of service with the Bethlehem Pacific Coast Steel Corp. at the San Francisco headquarters. Mr. Barker began work for Bethlehem as a timekeeper in 1907 at what was then the Union Iron Works, San Francisco.

• **George W. Putnam,** assistant district manager of the central district, Republic Steel Corp., Cleveland, has been made district manager, succeeding **C. W. Meyers,** who has resigned. **Walter M. Farnsworth,** divisional superintendent, and **E. R. Johnson,** district chief metallurgist, have been named assistant district managers. Mr. Putnam joined Republic as openhearth superintendent of the Youngstown district in 1933. In 1937, he was made assistant district manager of the Warren district and 2 yr later assistant district manager of the Central district. Mr. Farnsworth, assistant district manager, will also be assistant district manager of the Chicago district and will have charge of the electric furnace operation both in Republic's Central and Chicago districts.

GEORGE W. PUTNAM, district manager, Republic Steel Corp.

• **E. A. Tice** has joined the corrosion engineering section of the Development & Research Div. of International Nickel Co., Inc., at New York, as a corrosion engineer. He was previously associated with Bethlehem Steel in their research dept. as an engineer in the field of corrosion.

• **Gail Rutledge** has been appointed midwestern regional sales manager for the General Detroit Corp. and will be located in the Chicago branch office. In his new position he will supervise sales in the states of Illinois, Wisconsin, Minnesota and South Dakota. Mr. Rutledge was manager of the Philadelphia office and more recently assistant to the vice-president and coordinator of national accounts and branch operations. He joined the General Detroit Corp. in 1944. Succeeding Mr. Rutledge as assistant to the vice-president and coordinator of national accounts is **Harold J. O'Neill,** who first joined the corporation in 1942 as manager of the CD-Sno Fog Div. Later he became field manager, working out of the corporation's midwestern office in Detroit. In a short time, he became Central States zone sales manager for the states of Michigan, Ohio, Wisconsin and Kentucky.

GAIL RUTLEDGE, midwestern regional sales manager, Gereral Detroit Corp.

• **William J. Morris** has retired as active executive head of the Continental Supply Co., at Dallas, completing 40 yr with the Youngstown Sheet & Tube Co. and its sales subsidiary. He joined Youngstown Sheet & Tube Co. as a cost clerk in the accounting dept. in 1906. Within a few years he was vice-president in charge of finances. For a number of years he was principal advisor to James A. Campbell, one of the founders and second president of the company, and later to Frank Purnell, present president. In the early 1930's Mr. Morris was sent to Dallas to head Continental. While retiring from active duties, he will continue as chairman of the board and will be available when needed in an advisory or consulting capacity.

• **Arthur Landis** has been appointed general superintendent of Christy Park Works at McKeesport, Pa., of U. S. Steel's National Tube Co. Mr. Landis for 14 yr was vice-president in charge of manufacture for Auburn Automobile Co. He managed two Brooklyn plants of Sperry Gyroscope Co. in World War II. Before joining National Tube, he was vice-president in charge of operations of Snead & Co., Orange, Va.

• **Ronald Goodman,** who served on Gen. George T. Kenny's staff as public relations officer during the war, has been named publicity manager of Ekco Products Co., Chicago.

• **Thomas P. Archer,** vice-president of General Motors Corp., Detroit, who has been general manager of the Fisher Body Div., has been made group executive in charge of a new group of divisions which will consist of the Fisher Body Div., including Ternstedt, and the Buick-Olds-Pontiac Assembly Div. **L. C. Goad,** vice-president, who has been in charge of the Buick-Olds-Pontiac Assembly Div. and of the Dayton and Household Appliance Divs., is general manager of the Fisher Body Div., including Ternstedt. **B. D. Kunkle,** vice-president, has been placed in charge of the Dayton and Household Appliance Divs., and C. **B. Stiffler,** who has been Mr. Goad's assistant, is now assistant to Mr. Kunkle.

JOSEPH D. TAYLOR, JR., works manager, Anderson Stove Co.

• **Joseph D. Taylor, Jr.** has been appointed works manager of the Anderson Stove Co. recently acquired Breeze Corp., Inc. subsidiary at Anderson, Ind. Mr. Taylor was formerly with the Standard Gas Equipment Co. for 20 yr, where he served as superintendent of the Heavy Duty Div.

• **Harvey P. Barnes** has been appointed sales engineer for the Cleveland and northern Ohio territory of Hannifin Mfg. Co., Chicago.

• **Dr. Simon Freed,** former assistant chemistry professor at the University of Chicago, has been appointed chief chemist at the Monsanto Clinton Laboratories, Oak Ridge, Tenn.

• **Robert Hipkiss** has been named assistant sales manager of the Tool Div. of the Barcalo Mfg. Co., Buffalo. He joined Barcalo in 1939, and resumed work with the company following Army service.

• **C. H. Hedenberg** has been named operations manager of Goodrich Svenska Gummi, Aktiebolag, Stockholm, Sweden, subsidiary of the International B. F. Goodrich Co.

HARRY A. TRISHMAN, manager, Hydraulic Div., Erie Foundry Co.

• **Harry A. Trishman** has been appointed manager of the Hydraulic Div. of the Erie Foundry Co., Erie, Pa. He had been affiliated for 20 yr with the Adamson United Co., in the capacity of chief engineer.

• **Wilson N. Pratt** has joined Charles Hardy, Inc., New York, to supervise all powder metallurgical engineering activities of the firm. He replaces **J. J. Cordiano,** who has resigned to accept a position with Butler Bros. Mr. Pratt has been connected with the Jones & Lamson Machine Co., General Bronze Co., and American Electro Metals Corp. **Charles J. Hardy,** son of the late founder and former president of the organization, has taken up full-time duties on the engineering staff.

• **Hiram Brown** has been appointed chief metallurgist of Solar Aircraft Corp., Des Moines, Iowa. Previously he had been serving as chief metallurgist of the Solar Precision Casting Div.

• **Ebbe C. Anderson** has been appointed advertising and research manager for P. & F. Corbin, New Britain, Conn. He replaces **Frank A. Eustace,** who has resigned.

• **Edward B. Heyden** has been named to head the Construction Div. of the Graver Tank & Mfg. Co., Inc., East Chicago, Ind. Mr. Heyden has been associated with the Lummus Co. for the past 14 yr. He replaces **Lloyd K. Wells,** who is retiring. **John E. Fogarty** has been appointed to the post of general manager of the firm's Sand Springs, Okla. plant. He formerly managed the Graver Weldment Div. at the main plant in East Chicago.

• **H. H. Landis** has been appointed Joyce-Cridland Co.'s Eastern division manager, and will work out of the Dayton office.

• **William G. Arnold,** superintendent of the General Electric Co.'s Fitchburg, Mass., turbine plant, has been made plant manager.

• **D. D. Reichow,** manager of industrial relations, the B. F. Goodrich Co., Akron, Ohio, since 1941, has been named assistant to the vice-president of employee relations. **J. R. Thompson,** with B. F. Goodrich since 1930, has been named Denver district manager, Industrial Products Sales Div. He succeeds **John Gulledge,** who has been acting district manager in Denver and will now be assigned other duties in the Industrial Products Div.

• **John W. Baer,** recently returned from 3 yr service in the Army, has been appointed chief engineer for the Forker Corp., Cleveland.

• **J. G. Ripstra** and **Richard J. Skillman** have been added to the field sales staff of the Banox Div. of Calgon, Inc., Pittsburgh. Mr. Ripstra will work out of the Detroit office, covering Detroit, Grand Rapids, Chicago, Milwaukee and other cities in that area. He has been associated with the G. R. Varnish Corp. and Hayes Mfg. Corp. Mr. Skillman, working out of the Philadelphia office, will cover the eastern seaboard. He was a sales engineer with General Refractories Co. before joining the Navy in 1944.

• **H. R. Duffy** has been named labor director for the Hein-Werner Motor Parts Co., Waukesha, Wis. He has been in charge of the FBI office at Phoenix, Ariz.

• **William R. Elwell,** former sales engineer, has been appointed merchandising dept. buyer for Snap-On Tools Corp., Kenosha, Wis.

• **Lawson Adams** has been elected secretary and a member of the board of the Wrought Washer Mfg. Co., Milwaukee. He has been with the firm 5 yr.

OBITUARY...

• **George H. Wells,** 69, vice-president and treasurer of A. H. Wells Co., Inc., Waterbury, Conn., died recently following a brief illness.

• **Mathew Rubendunst,** 57, partner, Knowlton Engineering Co., Norwood, Ohio, died Sept. 1. He had been associated with the company since 1942. Prior to that he was for 22 yr general superintendent and chief engineer of the G. & G. Mfg. Co., Cincinnati.

• **Richard O. Breaker,** 35, president of Alloy Castings Co., Inc., Worcester, Mass., died recently.

• **Duward B. Badgley,** head auditor for the past 12 yr of the Harry Harris Co., Kearny, N. J., died recently.

• **Thomas A. Laux,** 62, assistant to the general manager of sales, Fabricated Steel Construction, Div., Bethlehem Steel Co., Bethlehem, Pa., died Sept. 6.

• **Fred W. Dixon,** 86, superintendent of the General Electric Co., Pittsfield, Mass. foundry from 1910 until he retired 16 yr ago, died recently.

For Accurate Machine Parts at Reduced Cost . . . use

J & L COLD FINISHED STEEL

Your machine parts can be made at lower cost from J&L Cold Finished steel because it is uniform. This means faster cutting speeds, less tool wear for you.

At J&L, steel for cold finishing is made expressly for that purpose. The required quality and grade are specifically outlined when the iron is made in the blast furnace, converted into steel at the Bessemers or open-hearth furnaces and rolled into bars or special shapes. The long experience of Jones & Laughlin in the production of Cold Finished steel from the time the process was invented by them further assures the uniform quality of the product—a quality that will enable you to step up your production of accurate machine parts. Write for further information.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

Dear Editor:

PIPE ORDER

Sir:

. . . At this time I would like to ask your assistance in helping me to locate sizes of galvanized pipe and fittings as listed on the attached sheet. Most all water in this part of the country has to be drilled for and piped and with the stepped up housing program, scarceness of all kinds of pipe is causing a great deal of hold-up and this item cannot be had locally. I would appreciate it if you could place an order with one of the Pittsburgh or Lorain mills for my pipe and fittings. . . .

J. V. PLISKA
Pliska Welding & Machine Shop
Midland, Tex.

● We certainly wish we could help out by placing your pipe order, but we have been trying for 2 months now to obtain 20 ft of galvanized pipe to relay a burst water line at home and still haven't been able to find any pipe. Have you investigated local surplus WAA stock? Have you checked with Civilian Production Administration, Washington, to determine if your activities rate priority assistance under the housing program? We are forwarding a list of all pipe mills and some warehouse sources with which you may want to check. —Ed.

ENGLISH V. METRIC SYSTEM

Sir:

We note in the July 18 issue of your publication on p. 98 that you have available copies of Mr. Finn's recent letter on the question of the English V. Metric System for the States. We would greatly appreciate a copy of this letter if one is still available.

J. H. BAKER
Manager
Armco Peruana S.A.
Lima, Peru

● Copy has been forwarded to you.—Ed.

COMPARABLE TOOL STEELS

Sir:

We enclose $2.25 for which please send us 15 copies of your "Comparable Tool Steel Chart."

G. T. ARMSTRONG
Livingston & Southard, Inc.
New York 4

PERMANENT MOLD CASTINGS

Sir:

Please mail tear sheets from your Apr. 4 publication, pp. 80-83, article entitled "Aluminum-Bronze Permanent Mold Castings" by B. Johnson.

THOMAS YONLEY
Advisor, Technical Service Div.
U. S. Dept. of Commerce
Kansas City

PAGING MR. IMHOFF

Sir:

Mr. Ray Farrington, president of W. F. Potts Co., has informed us you might be in a position to advise us of the address of Mr. Wallace Imhoff, a plater, formerly of Vineland, N. J.

G. THOMPSON
Charles P. Boyd Corp.
Philadelphia

● Mr. Imhoff's present address is 905 S. Bedford St., Los Angeles. Incidentally, Mr. Imhoff was the author of the very interesting article "Hot Air Dryer Doubles Galvanizing Output" which appeared in the Aug. 8 issue.—Ed.

FISSION AT BIKINI

Sir:

Will you please send me three copies of the article "Fission at Bikini" from the July 18 issue. This description of the bomb test was the best I have found.

EDWIN W. RIGDON
Div. of Development & Research
Timken Roller Bearing Co.
Canton, Ohio

POWER PRESS MAKERS

Sir:

We would appreciate it if you could possibly let us have a list of concerns who manufacture power presses, as we are desirous of making contact with these firms for the purpose of purchasing presses in conjunction with our patented equipment which we sell as a complete unit.

M. I. AYERS
General Manager
John W. Ayers & Son
Bloomfield, N. J.

● We have forwarded you a list of several such manufacturers.—Ed.

HIGH TEMPERATURE ALLOYS

Sir:

I am enclosing $1.00 as payment for four copies of the article "High Temperature Alloys." I would also like to know if you reprinted the series of articles on "Practical Tool Room Heat Treatment" which appeared in the issues of June 6 through June 27.

F. L. JOHNSON
Assistant Engineer
Shipbuilding Div.
Bethlehem Steel Co.
Quincy, Mass.

● Reprints of "Practical Tool Room Heat Treatment" are available at 50¢ a copy. We have already forwarded you the reprints of "High Temperature Alloys" as requested.—Ed.

STAPLE MAKERS

Sir:

Will you please put me in contact with a staple manufacturer whose products are used by paper box factories in the making of corrugated paper boxes and those types of staples used with a machine for closing the flaps on the boxes after they are filled.

L. B. ADAMS
L. B. Adams & Co.
Baton Rouge, La.

● Suggest you get in touch with Acme Steel Co., Chicago, Acme Staple Co., Camden, N. J., or National Screw & Mfg. Co., Cleveland.—Ed.

STATISTICAL STUDY

Sir:

Are tear sheets of the article "The Statistical Approach in Industrial Research," which appeared in the Aug. 22 issue, available? I should like two copies if they are. It is encouraging to note the appearance of statistical articles in your publication, for they do much to encourage the use of such techniques in industry.

CALVIN J. KIRCHEN
Statistician
Ballistic Standardization Unit
Remington Arms Co., Inc.
Bridgeport 2, Conn.

● We are mailing you two tear sheets of this article with our compliments.—Ed.

PRODUCTION CONTROL

Sir:

We would appreciate your sending us several reprints of the article appearing in the July 25 issue, pp. 49 through 51.

AL S. RUMMELSBURG
Plant Superintendent
Eveready Hardware Mfg. Co., Inc.
Brooklyn 11

● We did not reprint the article on "Production Control for Small Plants." However, tear sheets have been forwarded.—Ed.

REMOVING SAND AND SCALE

Sir:

Kindly send tear sheets of the following article which appeared in your magazine: May 16 issue, p. 51, "Removing Sand and Scale From Gray Iron Castings."

I. E. VALYI
A. R. D. Corp.
New York 5

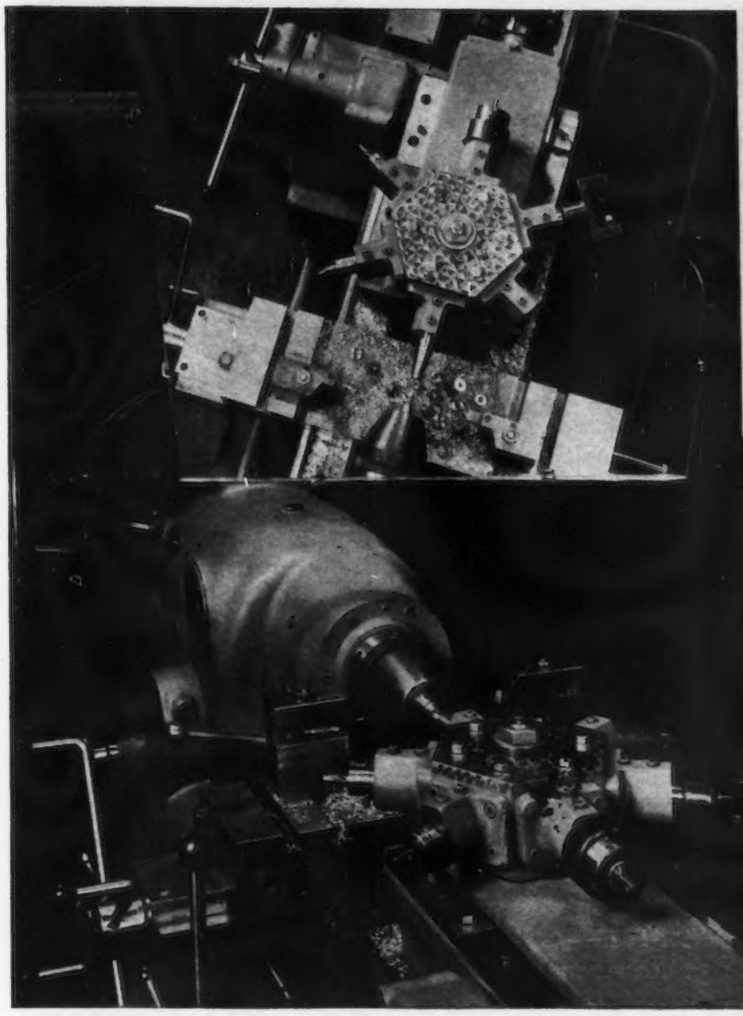
STEEL INDUSTRY EXPANSION

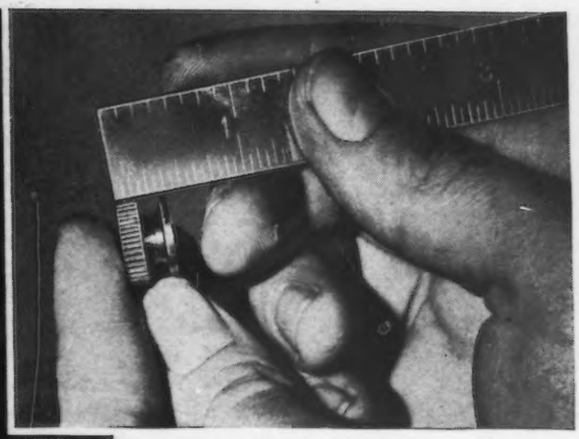
Sir:

I enclose herewith 20¢ in coin for two copies of "O'Mahoney Disposal Report Reveals Steel Expansion Data" reprinted from the June 21, 1945 issue.

I. ANDERSEN
Elektrokemisk Industri
New York

36.6 SECONDS FROM BAR TO FINISHED PART





Part—Knurled Clamp Nut
Material—Brass, 5/8" Bar Stock
Preselected Spindle Speeds—5
Time Per Piece—36.6 Seconds
Setup Time—43 Minutes

Here's another outstanding case of Speedi-Matic savings on repetitive manufacturing—knurled nuts rolling out at the rate of almost 100 an hour!

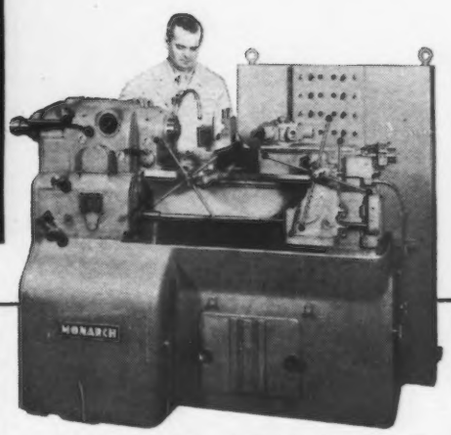
Each nut requires six speed changes per cycle. Time: 36.6 seconds! Small wonder that users everywhere are calling the Speedi-Matic "the world's fastest hand screw machine!"

The Monarch Mirror shows the reflection of this efficient production setup: 7 operations, using 5 positions on the hexagon turret, plus the front and rear cut-off slides. The tooling is typical of the class of job on which you can save time and money with a Speedi-Matic. It combines maximum production with extreme accuracy on lots of 25 to 500 or more. Get the full facts *now*, while deliveries are still favorable.

THE MONARCH MACHINE TOOL CO.
Sidney, Ohio

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES



FOR PEAK PRODUCTION AT A PROFIT SPECIFY SPEEDI-MATIC

Here's what you get:

- Automatic electronic speed change, preselected for as many as ten stations.
- Complete range of spindle speeds—50 to 5000 rpm.
- Feeds from .0005" to .016" per revolution.
- Power feed ram-type turret.
- Spring-return hand-operated cut-off slide.
- Air-fed pusher-type collet attachment.
- Collet chuck capacity—7/8".

This Industrial Week . . .

- ***Steel Shipments Far Above Prewar Status***
- ***Delivery Jams Seen for Next Six Months***
- ***OPA Scrap Regulations Roundly Condemned***

OBSCURED to some extent by the tremendous steel demand and pressure for delivery is the fact that most steel consumers today are receiving material at a rate considerably above prewar years. Yet today it is apparent that it will be at least 6 months before the steel delivery situation eases to the extent that consumers will have the feeling that they are being adequately supplied.

However, in the past few weeks there has been a faint glimmer of hope that some products will move faster to manufacturing plants than was the case a few months ago. Still, sad news to customers whose major demand is for sheets and strip is the the prediction that there will continue to be huge carryovers and unfilled orders in these products by the end of this year.

Prime reason for the slow but continuous improvement in the production of major steel products is the unprecedented peacetime output of steel ingots since the latter half of June. Unshackled from strikes and slowdowns for the time being at least and wiggling over the accentuated obstacle of scrap shortages, the steel industry in the face of its own pessimism has been able to keep the steel ingot rate at or close to 90 pct of capacity for the past 11 or 12 weeks. There is this week no sign that a recession in this high output is an immediate prospect.

WHILE the postmortems over the validity of the recent scrap regulations put out by OPA continue, the steel ingot rate this week has climbed half a point from last week's revised rate of 89.0 to 89.5 pct. Steel mills continue to dip into meager scrap supplies and to supplement openhearth operation with a greater proportion of pig iron in order to maintain their present high rate of activity. Whether or not the OPA scrap regulations will have a substantial effect upon the scrap flow to the mills over a long period of time was this week an unanswered question.

The scrap trade this week was still smarting under what it considered to be a definite "double-cross" from OPA on its request for higher prices to compensate for higher labor and material costs. The immediate effect of the OPA scrap pronouncement was to cause a greater flow of scrap from yards to steel mills, but the increase in the rate of shipments was far below predictions made in some quarters prior to the OPA announcement on the scrap price situation.

The basic cause for the bitter resentment held by most of the scrap trade is the claim that this industry was one of the few if not the only one which has been consistently and bluntly turned down by OPA when requests for price increases have been made. Some reliable scrap authorities are pointing out that in return for the request of a price increase, the industry not only failed to get it but now faces the prospect of an army of 500 "snoopers" who will be dispatched to the country's scrapyards, steel mills and foundries in order to check on inventories.

It is also claimed that these 500 to 600 inspectors from OPA and CPA will have the authority of telling the scrap, the steel and the foundry industries what they can or cannot do with their scrap supplies. Inner OPA sources recently claimed that hoarded scrap totaled about 1.5 million tons, but scrap dealers state that this is not true and that actual figures would be only a small proportion of such a "fantastic" estimate. The consensus in the trade was that the general scrap situation has not been changed by recent developments and it can be expected that it will be several weeks before the arguments and counter-arguments subside.

THERE appeared this week to be differences of opinion among some steel producers as to the efficiency of government priorities for certain steel consumers. Some firms believe that the system will not damage the industry's own setup to any great extent, while an equal number are just as strongly attached to the feeling that more confusion instead of less is in the offing. Major reason for this apparent paradox is probably due to the fact that some steel companies are having priorities imposed upon them to a far greater extent than other companies and to a greater amount than the company's capacity relationship to total steel capacity. This situation, it is claimed, is due to the lack of capacity and production data as of today in the hands of the CPA.

The steel industry this week has embarked upon one of the most comprehensive price studies yet to be made in order to prepare their requests to the OPA for higher prices allowed by recent price legislation. It is expected that the data will cover a 3-month period and will probably be submitted to the OPA shortly after Oct. 1. Various formulas allowed by the price control bill will be applied by the industry to the figures, but there is a definite possibility that the ultimate plea will reflect a request for increases on an individual product basis rather than an overall earnings basis. For that reason it is probable that an across-the-board increase will be eliminated from the picture and that emphasis will be on requests for increasing those products, the profit on which does not reach that allowed by the price control bill.

For the past several months steel companies without exception have been concentrating on the production of items on which the profit has been good or have eliminated or drastically cut the output of products on which the return has been negative or low. Recent trends along this line include the elimination of track bolts for light rails from the schedules of one company, action by another plant by Jan. 1 stopping the output of track spikes, track bolts and other allied products, the continuation of withdrawals from market areas and the drastic reduction or elimination of concrete bar output by other firms.

• **ZINC SUPPLY LOW**—With heavy priority tonnages on the books for galvanized sheets, mills find themselves with lowest spelter inventories in years. One producer reported a 12-day supply on hand, where the usual inventory has always been at least 60 days. Another large producer had 5-weeks supply on hand against a normal stock of 7 weeks. Chief cause of the zinc shortage was the suspension of government subsidy to the mines from June 30 to July 26. The mines closed down or restricted operations as the selling price of zinc was too low to continue. July output of domestic mines slumped, 32,414 short tons, a 22 pct decline from June which also was off 11 pct and was smaller than the average monthly production of any year since 1934. Labor difficulties in the mines have also helped cut production but the undecided future of premium payments is the chief factor affecting the supply of zinc.

• **AUTO STEEL DELIVERIES**—Attempts to establish delivery dates for automotive steel are being hit from front and rear. In numerous instances, promises are made to customers and mill schedules set; then because of the scrap shortage district offices may find their quotas have been reduced thus limiting deliveries to the Detroit area. In addition, the number of orders carrying CPA certification is growing. This naturally results in still further extension of delivery dates.

• **COLD WINTER AHEAD**—Even with July production of 5,250,000 tons of coke. which was the highest since June 1945, there is little hope of balancing supply and demand before the middle of next year. Stocks of coking coal remain low with but 4 million tons on hand. This amounts to a 15-day supply at current operating rates. The normal supply essential, with the approach of winter, is considered to be 7 to 8 million tons, or a 30-day supply.

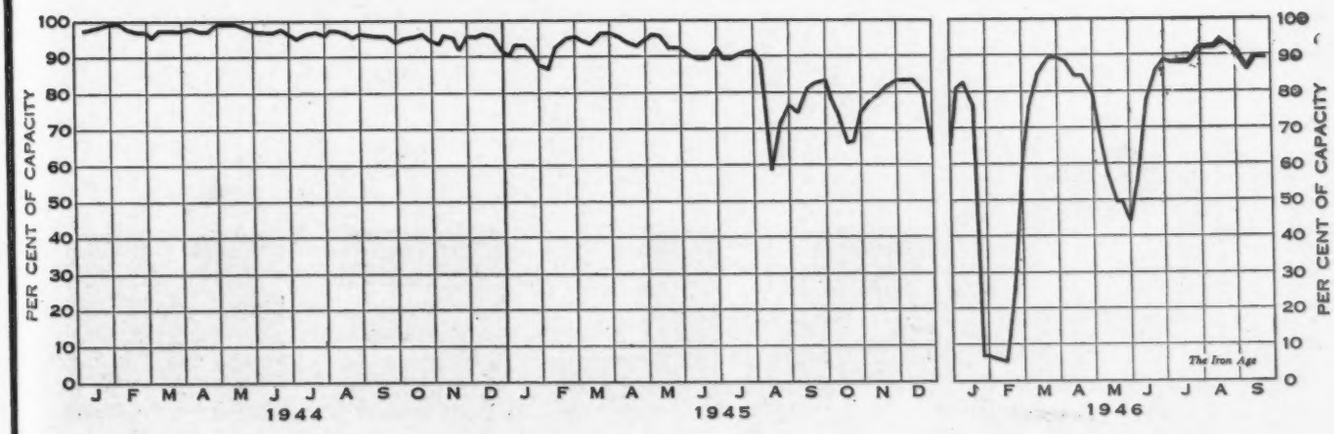
• **STEEL OUTPUT UP**—The production of steel ingots and steel for castings during August set a postwar record with production of 6,895,465 net tons, according to the American Iron & Steel Institute. The previous high since the end of the war was reached in July of this year with the production of 6,609,668 net tons, according to revised figures. One year ago production for August was 5,735,317 net tons. Production during August this year was at an average rate of 88.3 pct of capacity compared with 84.9 pct in July and 70.7 pct during August 1945.

• **UNBALANCED INVENTORIES**—Spotty production because of strikes and shortages are known to have created unbalanced inventories in many plants. Steel sales executives state that no order cancellations have yet appeared because of such conditions but that they may be expected by Jan. 1, should the present trend continue. Manufacturing plants who find themselves with large inventories they cannot use because of other shortages, have put the inventory to use by bartering it for other scarce parts or materials. One of the factors in favor of building up inventories whether they can be used immediately or not, is that all consumers are convinced higher steel prices are in the offing. Such convictions have led to the theory that inventories in finished steel products, no matter how unbalanced, are better than money in anybody's bank.

• **POLISH IRON AND STEEL OUTPUT**—According to a Warsaw report, Poland's steel production totaled 644,-032 tons during the first six months of this year, compared with 445,124 tons during the first half of 1945. The output of pig iron has shown an increase this year of 172,841 tons on the 1945 half-yearly total of 387,799 tons, and coke production has risen from 341,216 tons during the first half of last year to 489,528 tons this year. In June 1946 there were 15 blast furnaces, 31 openhearth furnaces, and 44 mills in operation in Poland.

• **EXTRUSION DIES**—Dies for extruding aluminum products are in critical supply, mainly because of the volume of new business and scarcity of skilled diemakers. Many plants where the handling and fabrication of aluminum had become second nature during the war set up to market lines of postwar aluminum products, and the demand for extrusions skyrocketed. Many similar end products required a variety of dies. For example, the extruded shapes going into the manufacture of aluminum casement window frames are different for practically every manufacturer. Thus, different dies must be made for each shape and each size. Die demand is expected to continue in the critical stage for many months to come, with extrusion producers manufacturing as many as possible themselves and farming work out wherever capacity is found.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
September 10...	99.0*	90.5	87.5	88.0	96.0*	102.0	95.0	99.0	101.0	66.0	101.5	56.0	94.0	89.0*
September 17...	101.0	90.5	87.0	82.0	97.0	102.0	96.0	99.0	95.0	73.0	88.0	56.0	100.0	89.5

* Revised

ENGINEERED HEAT for production Economy

● Salem specializes in planning, designing, building, and installing of heating equipment and the production facilities leading up to and beyond the actual heating operation. Our experience embraces all sizes and types of plants such as forge shops, pipe plants, rolling mills, and brass strip mills.

Salem furnaces and allied equipment literally fit into production lines. And Salem's practical suggestions usually stimulate economy in the allover production job.

As evidence of new Salem developments which were based upon production economy, we point to the world's largest rotary furnace, all of America's butt weld pipe mills, all circular soaking pits, small arms ammunition plants, as well as Salem continuous annealing and heat treating furnaces, also, Salem batch type ingot heating furnaces operating throughout America and abroad.

Avail yourself of Salem's engineering experience in designing your new production facilities. Investigate the production and economic advantages of Engineered Heat.

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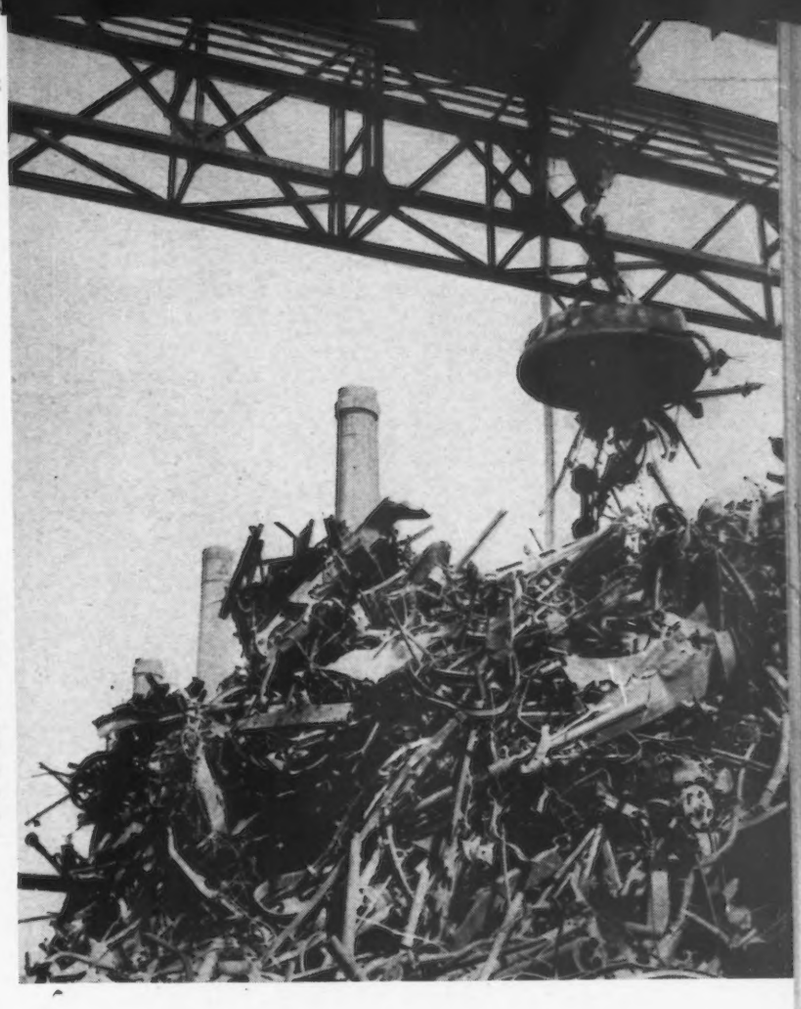
LONDON, ENGLAND

OPA Scrap Action Threatens Openhearth Operating Rate



IF IT STICKS: *Under tightened OPA regulations, with a double staff of inspectors, the old definition: "If it doesn't blow off the magnet it's No. 1 heavy melting," may go by the board.*

New York

• • • **Last week's action** of the Office of Price Administration in denying a steel scrap price increase, coupled with imposition of further scrap trading restrictions, may reduce openhearth operations at many steel mills. This opinion was put forward here by well informed scrap industry sources in explaining that the price agency had in effect double-crossed its own industry advisory committee.

Washington apparently realizes that the ban on tie-in sales, the elimination of the low phos premium and emphasis on accurate grading with a doubled OPA staff will tend to further paralyze the market. This is seen in the news that CPA will take on a force of 600 men in an attempt to control scrap inventories and allocate material.

In explaining why they feel they were double-crossed by the OPA, scrap sources state that the industry advisory committee had made its recommendation for elimination of certain illegal practices in good faith on the assumption that a price increase would give the dealer approximately the same return as he was getting under the somewhat illegal setup.

Amendment No. 8 to MPR 4, the scrap price regulation, is reprinted in full on p. 100 of this issue. The comment of E. C. Barringer, president, Institute of Scrap Iron & Steel, appears on p. 104.

It was explained that tie-in sales with their consequent higher scrap costs caused by cross-hauling coupled with widespread payment of low phos premiums by basic openhearths had in effect raised average scrap prices. Thus the effect of the OPA announcement has been to reduce average prices for No. 1 heavy melting steel scrap in a period of higher operating costs.

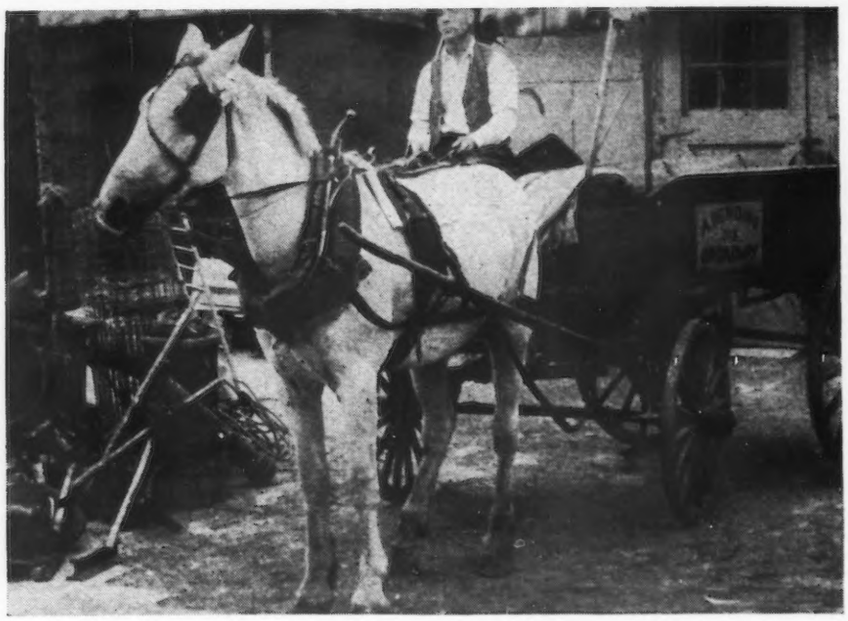
Reliable sources estimate the amount of low phos bought for use in basic openhearths at approximately 50 pct of total shipments of No. 1 heavy melting scrap. While purchase of genuine low phos by basic openhearths was not illegal prior to issuance of Amendment No. 8 to MPR 4 on Sept. 11, it is known that a considerable proportion of the tonnage moved as such was merely upgraded to give the dealer the $2.50 low phos premium as an incentive to get the material to the mills.

In this connection it is reported that several of the larger eastern mills which declined to accept overgraded shipments in any form are in a desperate plight for scrap. Some mills which declined to pay questionable premiums used tie-in sales to maintain steelmaking operations. With both of these practices prohibited by the latest OPA action and with dealers getting what amounts to lower steel scrap prices it appears almost inevitable that dealers will somewhat relax their efforts in steel scrap and concentrate on other types of business.

The government apparently realizes the problem involved but experienced observers are doubtful if stricter control and the addition of an army of snoopers will solve it. It is going to be exceedingly difficult, if not impossible, for CPA to recruit 600 men capable of checking scrap inventories in an intelligent fashion. Details of the method by which CPA plans to allocate scrap have not been revealed but it will be a tremendous organizing job which will take some time to get fully under way. Steel mill purchasing agents are already hard at work seeking allocations to maintain their operations, and a number have already been made with basic openhearths getting allocations of low phos and thereby permission to pay the premium.

While it is too early to assay the effect of the cast iron scrap increase certain trends are becoming apparent. Prior to the OPA action a considerable amount of iron scrap was moving to foundries at prices in the neighborhood of $30 delivered. Thus the price agency action sets a new price at what had been the black market figure. Unquestionably, the increase will bring out more remote scrap—how much it is difficult to tell at this time.

Automobile graveyards have



BACK IN BUSINESS? *Higher prices for cast iron scrap may bring back the small collector who walked his horse in greener pastures during the past few years. At least this is the fond hope of foundering foundrymen. (March of Time.)*

been given a nice incentive to move clean cast at a $7 increase but many of them have been making more money selling replacement parts than they can earn from scrap. Observers therefore do not look for an overnight clean-up of the auto graveyards.

Imposition of a ceiling of $3.50 less than prepared on unprepared scrap purchases was greeted with mixed reactions. The OPA Scrap Industry Advisory Committee had asked for a $1.50 increase in the $3.50 spread but approved the establishment of a ceiling to eliminate outside interests. The unprepared ceiling will, it is felt, be most satisfactory on production lists from large industrials, railroads and Navy Yard lists though it reduces all dealers to equality with the award going to the dealer lucky enough to have his name drawn from the hat.

A recent Navy Yard offering of 1500 tons at Brooklyn produced 15 tie bids at the new ceiling with brokers forced to bid 50c less, and thereby eliminated. However, it is not expected that this situation will continue since brokers can bid through affiliated yards.

On smaller lots it is not believed that the unprepared ceiling will be effective since a lot containing some cast iron could be bid in at the cast rather than the No. 1 steel ceiling price. If OPA had the qualified inspectors to police all these sales the net effect would be to put all prospective purchasers on the same level, preventing an alert dealer from bidding up the price to get certain items such as beams for which he might have a market at well above scrap prices.

Of course, any mill possessing electric furnaces or acid openhearths could continue to pay the low phos premium and divert the material to a basic openhearth, but if the activity of OPA agents in Pittsburgh at this time is any criterion, this may be difficult to do. On the other hand CPA may legalize low phos premiums by "allocating" material under Par. 7, Section 3 (b) (1) of the Sept. 11 Amendment.

Summarizing the net effect of the recent OPA action, observers here believe there will be an immediate release of so called hoarded steel scrap but that the volume will not come anywhere near the 1.5-million ton OPA estimate. Dealers will definitely not break their backs to move this material quickly. Nor is the long term picture very bright, scrap steel sources indicate. In the cast iron field there is some reason for a little more optimism although none of this material was hoarded so there is no reservoir to draw on immediately.

Cleveland

• • • **Some scrap buyers,** taking their cue from the handful of cars moved since last week and the number of meetings being held by dealers and brokers, jointly and severally, believe that something approaching a sit-down strike is in the wind. Such a term is, of course, a poor description of the situation and resultant attitude of the scrap trade, but there has been little scrap moving since the first of last week.

Allocations, both in Cleveland and Chicago, have inspired the statement that CPA through allocations or permission to use electric furnace scrap in the openhearths, may be able to save OPA's face. Many dealers and yard men were, of course, counting on a sufficiently large increase from OPA to spur the lagging collections of scrap which now will be further shunted back in favor of waste paper and salvage, on which there is far more profit.

Scrap buyers in this area were all busy trying to get allocations through early this week, as it was apparent that only through allocations can CPA keep the situation fluid at this particularly pressing moment. Brokers feel that dealers will ship after a while, but the dealers themselves, a highly disgruntled group, will probably not go out of their way to move any scrap until financial necessity forces it upon them.

•

Philadelphia

• • • **Scrap dealers and brokers** here point out that the net result of the recent OPA action is expected to be a further shortage in mill and foundry scrap. The immediate result of the order is likely to be a flurry of shipments since yards had begun loading cars when it became known that price action was expected and these will of course be moved

Dealers state that the shortage of scrap is due to the lack of financial incentive to the collectors to bring in scrap from remote areas, particularly farms and auto graveyards, and encouraging the removal and scrapping of obsolescent machinery. Much scrap originating in the Philadelphia area comes from industrial plants from which scrap must move regardless of price. However, it is expected that the curtailment of

supplies will be felt to the maximum extent in New England.

Dealers are disappointed over the $3.50 price spread between prepared and unprepared scrap. They believe that scrap producers will expect to receive the ceiling on unprepared scrap but they will be unable to prepare and handle scrap for this spread in view of the higher current labor costs. The establishment of this spread for sales of government scrap will of course cut down the return to the Navy and Maritime Commission on shipbreaking work while it increases returns to bidders for unprepared scrap. It may be expected that most bids for unprepared ship scrap will be at the ceiling and awards must be made on some other basis than price. Formerly, some bids approached or exceeded the prepared scrap ceiling and the scrap dealers covered their costs and profit out of the nonferrous metals and various other equipment contained.

•

Detroit

• • • **While the new tie-in** regulations may eliminate some "deals" between warehouses and steel mills the new regulation is expected to have little effect on present agreements between mills and large industrial users. It is contended that such agreements are not a part of the sales contract and have been in effect in some form for many years. Such "understandings" are seldom if ever of a compulsory nature and are bound to be continued in some form.

Foundries stand to benefit to some extent by the new rules covering low phos scrap but some of the mills will be very hard hit unless some relief is granted. The present interpretation is that production scrap will be barred to Great Lakes openhearth furnaces and since this has heretofore been the best scrap source, operations at Great Lakes will undoubtedly be adversely affected. It is understood that Great Lakes inventories have been dwindling in recent weeks and that the new regulations will almost immediately create a critical situation. Rotary will be relatively unaffected as will Ford which operates both openhearth and electrics.

Establishment of a ceiling on unprepared is generally regarded as a long overdue move although there is some objection that it will tend to discourage marginal scrap from coming into the market. At the same time, most dealers and brokers will be glad to see an end to the payment of over-ceiling prices for unprepared production scrap. Of all of the new regulations, this one seems to be the most favorably regarded.

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Chicago

• • • **The recent OPA action** was poorly received by the entire scrap industry here, particularly the dealers. Foundries expect shipments of cast scrap to increase so that within a month their supplies will meet demand. As ceiling prices are off on most castings, the influence of the higher cost of scrap on prices cannot be determined. The unbalanced scrap price picture, it is believed here, will force dealers to become even better opportunists if they are to stay in business. The mills are afraid that they may be forced to ask for allocations of the higher priced grades to keep running if shipments don't improve.

Most of those in the industry don't believe that tie-in sales can be prevented or that OPA can possibly hire enough checkers to stop the thing. By not giving the dealer a better spread between prepared and unprepared, a lot of scrap will go direct to the consumer and may, in effect, put the middleman out of business.

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Pittsburgh

• • • **The reaction of dealers** to scrap developments, from Pittsburgh to Houston, according to one large concern, was bad. It is felt that OPA tried to smooth over a bad situation with a cast iron price increase. Further, the regulation that shipments through brokers or direct to mills, at 50¢ a ton less than shipments to dealers, will mean nothing, since the brokers will move the material through affiliated yards and completely circumvent the intention of the regulation.

Production scrap will move and in continually better volume. The scrap lists are noticeably improving every week, and, while the scrap has been earmarked, there has been evidence of more of it moving into normal channels.

Many dealers feel that scrap rejection is and should be a function of the purchaser, and are bitter about OPA's crusade in the Pittsburgh area recently. Inspectors have been hitting various mills in the immediate area, checking cars for overgrading.

From the standpoint of the mills, it is felt that the OPA regulation, despite its actual content, will temporarily loosen up the scrap. The price question, hanging fire for nearly a month, was the cause of the stoppage of scrap shipments, and observers reason that its settlement alone will start scrap moving in better quantity.

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U. S. Offers to Lease 14 Surplus Shipyards For Shipbreaking Use

Washington

• • • **Fourteen government**-owned shipyards have been made available for leasing to qualified shipbreakers to be used in converting surplus ships into badly-needed scrap, according to the CPA.

Most of the shipyards are near the James River, Mobile Bay and San Francisco Bay areas where the majority of the ships to be scrapped are anchored.

The Maritime Commission has already sold 106 vessels totaling 340,000 tons, and plans to sell 110 more totaling about 400,000 tons by the end of the year.

WAA will consider offers from prospective shipbreakers for leases for all or part of the shipyards. Bond will be required to insure that the property is properly cared for and scrapping operations completed. Terms of the leases will be based on production with a minimum rental for the property and facilities used.

The shipyards to be made available under the shipbreaking program are: New England Shipbuilding Corp., South Portland, Maine, East Yard and South Yard; General Ship & Engine Works, East Boston, Mass. (The WAA Boston office at 11 Avery St., Boston, will handle the leasing of these yards.); J. A. Jones Construction Co., Brunswick, Ga.; Southeastern Shipbuilding Corp., Savannah, Ga.; J. A. Jones Construction Co., Panama City, Fla.; Alabama Dry Dock & Shipbuilding Co., Mobile; Delta Shipbuilding Co., New Orleans (The WAA Birmingham office at P.O. Box 2090, Birmingham, will handle the leasing of these yards); Todd Houston Shipbuilding Corp., Houston, (The WAA Dallas office at 2001 McKinney Ave., Dallas, will handle the leasing of this yard); Barrett & Hilp, Belair Shipyard, South San Francisco, Calif.; Permanente Metals Corp., Richmond, Calif., Yard No. 1 and Yard No. 2; Kaiser Co., Inc., Richmond Yard No. 4, Richmond, Calif.; (The WAA San Francisco office at 30 Van Ness Ave., San Francisco, will handle the leasing of these yards); Oregon Shipbuilding Corp., Portland, Ore., (The WAA Portland office at Swan Island, P.O. Box 4062, Portland, Ore., will handle the leasing of this yard).

H. C. Frick Opens Robena Mine To Supplement Its Coking Coal Reserves

Pittsburgh

• • • **The formal opening** of the Robena mine, the newest coal properties developed by the H. C. Frick Co., U. S. Steel subsidiary, attended by some 500 industrial and commercial executives in the western Pennsylvania area, consisted of an inspection of the surface facilities at the Colvin Shaft and at the river terminal.

The Robena mine, consisting of a 69,000-acre tract of Pittsburgh seam coal in Greene County, 80 miles south of Pittsburgh, will be use to supplement the company's Connellsville coking coal reserves in Westmoreland and Fayette Counties. Too high in sulfur content, the coal must be blended and go through a beneficiation process. The reserves are located on the Monongahela river, with navigable river access to Pittsburgh.

The cutting of the mine, which is ultimately to yield a record output of 20,000 tons a day, involves some very unusual techniques, and the handling of the coal after its actual mining is believed revolutionary in coal handling and beneficiation. Handling from the classification and storage yard is by Link-Belt system designed especially for the mine. The mine has an underground classification and storage yard where the coal receives its first blending as mine cars originating in high and low sulfur sections merge. The cars proceed into a twin rotary dump in groups of 10 cars each, are turned over, discharging about 120 tons of coal into a common hopper and slope belt below.

The slope belt delivers the coal from the underground dumps to the screen house, 765 ft away at 600 fpm (2800 tons an hr), where the minus 3-in. coal is screened out. Oversize coal is hand picked for sulfur balls and slate on four picking tables. It is then crushed to pass a 3-in. screen, mixed back with the original minus 3-in. coal, and delivered by belt to the raw coal blending bin.

Delivered by 60-in. belt to the 18,000-ton blending bin, the coal is separated by analysis into the cellular type blending bin. This bin has 168 cells, each holding 108 tons of coal. Through this cell-type setup, coals of various analyses can be segregated, and, when ready for delivery selection of these various analyses permits the delivery of coal of desired sulfur content. This cell-like arrangement is six cells wide by 28 cells long, and they empty in groups of four onto four belts that carry the coal onto a main belt or conveyance to the transfer house.

At present a coal washer plant is being constructed, and, when completed will be a gravity separation process that removes slate, rock and pyritic sulfur which contaminates the coal, since these items are of a higher specific gravity than the coal itself. Organic sulfur, which is chemically combined with the coal cannot be removed by washing, but it is believed that 40 to 50 pct of the pyritic sulfur can be removed in the washing plants.

At present, however, from the transfer house the coal is delivered to the river tipple for loading into barges. The conveyance is by 20-in. belt conveyor to the tipple, where it is spread out by shuttle belts in the tipple bins. The coal is drawn from these tipple bins by seven belt feeders, discharging to chutes that drop the coal down into the river barges. Barges of 900 tons capacity can be loaded from the tipple in 6 min.

The mine, long planned, was first opened through the Ronco mine on the other side of the Monongahela River from present operations. Parallel entries were driven from Ronco under the river into the present workings. In June 1942, the sinking of the first four-compartment shaft was started on the Colvin tract, from which the shaft gets its name. Other mine openings were made in February 1943, the Gray shaft; an air shaft known as the Hartley shaft; and in March 1946 the four compartment Gerard's Fort. All except the Hartley shaft, which is an air shaft, are designed for air, men, material and slate hoist.

Scrap Advisory Member Resigns; May Presage Same Action by Others

Washington

• • • **Starting what** may prove to be a predicted exodus, William J. Wolf, of Wolf & Co., Middletown, Ohio, has resigned as a member of the OPA Scrap Industry Advisory Committee in protest at the agency's refusal to increase scrap prices as recommended by the Committee.

The walk taken by Mr. Wolf, who is also a member of the David J. Joseph Co., Cincinnati scrap dealers, and second vice-president of the Institute of Scrap Iron and Steel, reflected the resentment of the Committee as well as the scrap trade generally that OPA had disregarded its proposal, for across-the-board scrap prices increases. These not only were declared by the consumers themselves as necessary to develop tonnage, if steel production were to be maintained, but were reported as having strong White House support.

Scrap dealers have stated that despite OPA's turn-down, they propose to "keep things churned up" for increased prices. Thus they propose to buck OPA Administrator Porter's statement that his decision would hold for 6 months.

The OPA Scrap Advisory Committee finds itself in no exclusive position in its ill mood toward OPA. Much more significant is the growing feeling of CPA itself against the pricing agency reflected in several instances last week. The OPA Brass Mill Advisory Committee turned up its nose at OPA, laid down its tools and after adopting a resolution went on a sit down strike in protest against what the Committee bitterly assailed as "government inaction on urgently needed raw materials."

Previously CPA asked in vain that OPA price ceilings be removed from casein. Another CPA shot at OPA was taken when one of its advisory committees said the electrical installation industry was in a desperate plight because of inability to get cotton cloth for insulating wires, cables, motors and generators. CPA taking an over-the-shoulder shot at OPA said it had refused this group's request for a set-aside order on cotton cloth because the problem "is essentially one of prices."

Alco Sets Up Assembly Line for Mass Production of Diesel Electrics

Schenectady

• • • **Production of diesel-electric** locomotives on a mass production basis has been inaugurated here at the plant of American Locomotive Co. Introduction of mass production at this plant was marked recently by the completion of the company's 75,000th locomotive, a new 6000-hp Alco-GE diesel-electric engine constructed under the new method. Completion of this locomotive marks the "full-scale introduction in the locomotive industry of standardized units by mass production methods," according to W. L. Lentz, Alco vice-president in charge of manufacturing.

Facilities for production of diesel-electric locomotives here include a number of buildings originally used by the company to construct tanks during the war. The machine shops are equipped with practically all new machines and represent one of the most modern and efficiently equipped heavy shops in the country.

The shop layout provides for straight line assembly, with subassemblies feeding into the main line from shop bays. When the company's new development program is completed it is expected that three complete units will be produced each day. Difficulty in obtaining equipment and materials will likely hold the rate down to 1 unit per day for the immediate future. Present employment is approximately 8000, as compared with a prewar peak of 4500. Manufacture of diesel engines is being transferred from the company's Auburn plant. The latter plant will in the future specialize in stationary and marine diesel engines.

The new 6000-hp diesel-electric locomotive, shown in the accompanying illustration, consists of three 2000-hp units. Built for the Santa Fe, the engine is powered by 16-cylinder V-type engines, rated at 2000 hp each. A feature of these engines is the employment of GE turbosupercharging equipment operating of hot exhaust gases. These superchargers, an outgrowth of the GE unit originally developed for aircraft use, operate at a turbine temperature of 1200°F. Another new design feature is the use of an eddy-current clutch to drive an auxiliary. Cylinders of the new V-type engines are porous-chrome plated. This engine, according to Alco officials, is designed to operate a million miles, or 3 yr of service, without a major overhaul. It can be used for fast freight work or for passenger service.

SUPER-SUPER CHIEF: *Boasting the use of turbosuperchargers of the type originally developed for aircraft use, this new Alco diesel-electric locomotive, rated at 6000-hp. will shortly go into service on the Santa Fe. Two of the engine's three 2000-hp driving units are shown here during recent road tests.*

Railroad Car Institute Report Shows Drop In Freight Cars in Use

Pittsburgh

• • • **In its annual** report of railroad car building and repair activities, the American Railways Car Institute indicated that at the end of 1945 there were 1,812,946 freight cars in use, plus another 268,109 that are privately owned. This is a decline of about 10,000 cars from 1944, but is higher than any other year since 1936. From the statistics of the association, freight cars in service have been gradually declining since the peak year of 1926, when a total of 2,435,269 cars were in service in this country plus 288,603 cars that were privately owned.

Cars retired during 1945 by Class I railroads were greater in number than 1944, totaling 51,331 against 30,987 in 1944. New cars put into service in 1945 numbered 41,870—2784 less than in 1944, when 44,654 cars went into service. Cars built during 1945 totaled 43,864 against 43,003 in 1944, while cars on order took a decided slump from 1944. Only 38,230 cars were ordered during the last year of the war, with its last quarter of peacetime operations, whereas in the war year 1944, 54,481 cars were ordered.

In its study of the age of freight carrying cars of Class I railroads in the United States, the association shows that 13.4 pct are from 1 to 5 yr old; 11.6 pct are from 6 to 10 yr old; 2.5 pct are from 11 to 15 yr old; 17.7 pct are from 16 to 20 yr old; 22.3 pct are from 21 to 25 yr old; 13.7 pct are from 26 to 30 yr old and 18.6 pct are over 30 yr old. The average car age of all freight cars in service with Class I railroads in the United States is 20.5 yr.

Surplus Arc Welding Units Placed on Sale

Washington

• • • **Several thousand** surplus arc welding units, both gasoline and electric, are being placed on sale by WAA at its regional offices. They may be purchased in any amounts; for lots of from one to 20, prices are fixed but for quantities of 20 or more, volume lot prices may be negotiated with WAA.

Complete Text of New OPA Scrap Price Amendment

Washington

• • • The following is the text of Amendment 8 to the OPA scrap price regulation, effective Sept. 11, 1946:

TITLE 32—National Defense
Chapter XI—Office of Price Administration
Part 1306—Iron and Steel
[MPR 4, Amendment No. 8]
Iron and Steel Scrap

A statement of the considerations involved in the issuance of this Amendment, issued simultaneously herewith, has been filed with the Division of the Federal Register.

Maximum Price Regulation No. 4 is amended in the following respects:

1. In Section 1, between the third and fourth paragraphs, the following is added:

No industrial producer or government or governmental agency (whether federal, state or local) shall sell or deliver unprepared iron or steel scrap to any person at prices higher than the applicable maximum prices set forth in this Regulation. No person shall buy or receive unprepared iron or steel scrap from such industrial producer or government or governmental agency at prices higher than the applicable maximum prices established by this Regulation.

2. Section 1 is amended by adding, immediately before the last paragraph, the following:

No person shall sell or deliver iron or steel scrap upon condition that the buyer shall sell or deliver to any person any other commodity. No person shall buy or receive iron or steel scrap upon the condition that he shall sell or deliver to any person any other commodity.

3. The table in Section 11(a) is amended to read as follows:

Grades	Zone A	Zone B	Zone C
1. Cast iron No. 1 (cupola cast)	$23.00	$24.00	$25.00
2. Cast iron No. 2 (charging box cast)	19.00	20.00	21.00
3. Cast iron No. 3 (heavy breakable cast)	18.00	19.00	20.00
4. Cast iron No. 4 (burnt cast)	15.75	16.75	17.75
5. Cast iron brake shoes	15.75	16.75	17.75
6. Stove plate	21.00	22.00	23.00
7. Clean auto cast	25.00	26.00	27.00
8. Unstripped motor blocks	18.00	19.00	20.00
9. Wheels No. 1	20.00	21.00	22.00
10. Malleable	22.00	23.00	24.00

4. Section 20(b) is amended to read as follows:

Sec. 20(b) The maximum basing point prices for unprepared iron or steel scrap (other than material suitable for hydraulic compression) when sold to any person other than a consumer or his broker shall be $3.50 per gross ton beneath the maximum basing point prices of the prepared base grades, No. 1 heavy melting steel or No. 1 railroad heavy melting steel, as established in Section 3 or 7. The maximum basing point prices for unprepared iron or steel scrap (other than material suitable for hydraulic compression) when sold to a consumer or his broker shall be $4.00 per gross ton beneath the maximum basing point prices of the prepared base grade, No. 1 heavy melting steel or No. 1 railroad melting steel, as established in Section 3 or 7.

5. Section 20(c) is amended to read as follows:

Section 20(c) The maximum basing point prices for unprepared material which when compressed constitutes a No. 1, No. 2 or No. 3 bundle, when sold to any person other than a consumer or his broker, shall be $4.00 per gross ton beneath the maximum basing point prices for those prepared grades as established in Section 3. The maximum basing point prices for unprepared material, which when compressed constitutes a No. 1, No. 2 or No. 3 bundle, when sold to a consumer or his broker shall be $4.50 per gross ton beneath the maximum basing point prices for the prepared grades as established in Section 3.

6. Section 20(d) is amended to read as follows:

Sec. 20(d) The maximum basing point prices for tin cans or other tin or terne coated material from which Grade No. 3 (tin can bundles) is produced, when sold to any person other than a consumer or his broker shall be $3.50 per gross ton less than the maximum basing point prices established for that prepared grade in Section 3. The maximum basing point prices for tin cans or other tin or terne coated materials from which Grade No. 3 (tin can bundles) is produced when sold to a consumer or his broker shall be $4.00 per gross ton less than the maximum basing point prices established for that prepared grade in Section 3.

7. In Section 3(b) a new subparagraph (1) is added to read as follows:

Sec. 3(b) (1) The premiums established for grades 14, 15, 16, 17, 18, 19 and 20 may be charged only for steel scrap sold for use in electric furnaces, and acid open hearth furnaces, or foundries. No person shall charge, and no person shall pay, when purchasing such grades for use in basic open hearth or blast furnaces, a price in excess of the price for the corresponding basic open hearth or blast furnace grades unless the material is allocated to such person by the Civilian Production Administration.

8. Section 3(a)(1) is amended to eliminate the following grades:

13. Billet, Bloom and Forge Crops ..... +$5.00
22. Two foot foundry steel... + 1.50
23. One foot foundry steel.... + 2.00
24. Springs and crankshafts.. + 1.00

9. Section 3(b)(2) is amended to read as follows:

Sec. 3(b)(2) The prices established for Grade 25 (alloy free turnings) and Grade 26 (heavy turnings) may be charged only when shipped to a consumer directly from an industrial producer of such grades; otherwise the maximum price for such grades shall not exceed the price established for the corresponding grade of basic open-hearth and blast furnace scrap.

10. Section 23 is amended to eliminate items 13, 22, 23, and 24.

11. Section 28 is amended by adding a new paragraph (1) to read as follows:

Sec. 28(1) "Industrial producer" includes any person who generates iron or steel scrap as a result of manufacturing or fabricating operations. It also includes any common carrier, transportation company, or public utility company.

This Amendment shall become effective Sept. 11, 1946.

CPA Moves to Increase Flow of Pig Iron For Brakeshoes; Housing

Washington

• • • Under an amendment to Direction 13, M-21, foundries which produce gray and malleable iron castings for railroad brakeshoes and specified items relating to the housing program may apply for authority to place a certified order for merchant pig iron to make those products, it is announced by CPA. The specified items are:

Railroad brakeshoes, builders' hardware listed under Direction 18 to PR 28, electrical wiring devices listed under Schedule I to PR 28, cast iron soil pipe and fittings, tubular and convector cast iron radiation, cast iron pressure pipe and fittings, warm air furnaces and wall and floor furnaces, bathtubs, sinks, sink and tray combinations, lavatories, low pressure boilers for residential heating, and screwed pipe fittings of three classes—gray cast recessed drainage 2 in. and under; gray cast steam fittings 3 in. and under; and malleable fittings, including unions 2 in. and under, 150 lb SWP.

Applications for October purchases must have been filed on or before Sept. 15; for November, by Oct. 5; and for December, by Nov. 5. Form CPA-4504 should be used.

Weekly Gallup Polls . . .

G. O. P. More Confident of Victory Than Democrats

Princeton, N. J.

• • • **Republican voters** are more confident than Democrats of victory in the Congressional elections this fall.

Nearly four out of every five Republicans willing to venture a guess think that the G.O.P. will take over control of the House.

Democrats, of course, don't agree with that. Two out of every three Democrats with an opinion say their party will be in control when the ballots are counted, according to George Gallup, director, American Institute of Public Opinion.

Anybody with an itch to bet on the elections should weigh the greater optimism of the Republicans against the past performance of the party. Surveys reveal that Republican voters were equally confident prior to the last two presidential elections when, as it turned out, they were beaten at the polls.

However, political observers are in general agreement today that the two major parties seem more evenly matched than was the case in either 1940 or 1944.

How the voters in each party view the outcome of this year's Congressionals is shown in the following poll by the Institute:

"Regardless of how you yourself plan to vote, which party do you think will win control of the House in the Congressional elections this fall—the Democratic or the Republican?"

Those who indicated that they themselves are Republicans voted as follows on the question.

G. O. P. Voters

	Pct
Think Republicans Will Win Control	79
Think Democrats Will Win Control	21

Those who indicated that they themselves are Democrats voted as follows:

Democratic Voters

	Pct
Think Republicans Will Win Control	36
Think Democrats Will Win Control	64

When the replies of all voters are combined, a majority of 58 pct of those with opinions are found believing the Republicans will take over control of the House.

Approximately one major party voter in six (16 pct) was unwilling to venture a prediction.

Polls asking the public who it thinks will win an election have an important bearing on one of the oldest and hoariest of political myths—the bandwagon theory.

This theory holds that one dominating factor influencing a voter's attitude is his desire to be identified with the winning side—to climb on the bandwagon of whoever he thinks is in the lead.

The theory has been disproved in numerous studies of how public opinion actually behaves in an election campaign.

In 1940, for example, 66 pct of all major party voters questioned said they thought President Roosevelt would win the presidential election. Had the bandwagon theory been borne out, Mr. Roosevelt should have beaten his opponent, Wendell Willkie, by 66 pct, or something close to that figure, because the people who thought he would win would presumably hasten to jump on his bandwagon.

Yet Roosevelt actually won with only 55 pct.

In 1944, eight in every ten voters with opinions on the subject said Mr. Roosevelt would defeat Governor Thomas E. Dewey. Yet Mr. Roosevelt's margin was only 54 pct of the major party vote when the election ballots were all counted.

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The "battle" which war veterans staged at Athens, Tenn., when they wrested control of the town government from an entrenched political machine, has met with a mixed reaction throughout the rest of the country.

The number of voters who approve of what the veterans did is just about equalled by the number who disapprove of the tactics they used. However, veterans of World War II show a substantial vote of approval of what their colleagues did.

Majority of Voters Expressing Opinion Believe Republicans Will Capture House This Fall

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This is shown by a coast-to-coast poll conducted by interviewers for the Institute.

The issue has considerable national significance. There are reports that veterans in other states are contemplating similar action to get rid of political machines like that which ruled Athens and the surrounding McMinn County.

The survey shows that about five in every 10 voters (52 pct) have heard or read about the Athens affair. These were asked:

"What do you think about what the veterans did in the recent local election in Athens, Tennessee?"

When analyzed, the replies of the 52 per cent who had heard or read of the affair fell into the following general categories:

	Pct
All right, or all right under the circumstances	25
Good idea but wrong method, they went too far, shouldn't have used violence	20
No opinion	7
	52

Among World War II veterans 74 pct had heard or read of the Athens affair. Their reactions contrast as follows with those of the general public:

	Pct
All right, or all right under the circumstances	46
Good idea but wrong method, they went too far, shouldn't have used violence	26
No opinion	2
	74

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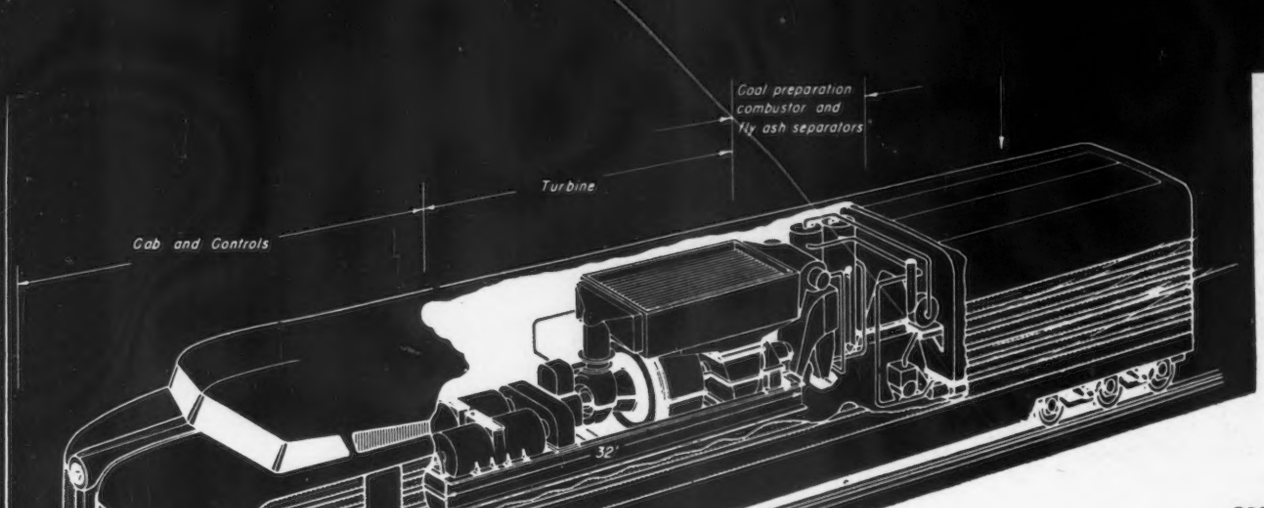
How typical voters throughout the country reacted to the news of the Athens affair is shown by the following comments selected

(CONTINUED ON PAGE 152)



ON ITS WAY: *Possible arrangement of the coal-fired gas turbine locomotive of the future. Dimensions of the locomotive can be estimated from the 32-ft. length of the turbine. This arrangement is based on the Allis-Chalmers unit. It is reported that leading locomotive builders will participate in its design.*

Coal Group Orders Two 3750-hp Locomotive Gas Turbines

New York

• • • Use of gas turbines in railroad locomotives, a new form of prime mover, moved closer to realization in this country when Bituminous Coal Research, Inc., recently placed contracts for powdered coal fired gas turbine units with Allis-Chalmers Mfg. Co., Milwaukee, and the Elliott Co., Jeannette, Pa. These units, when they are put into operation, will represent the first gas turbine powered locomotives in this country and the first powdered coal fired units in the world. Swiss railroads have utilized oil fired Brown-Boveri turbine units since 1941.

Chief significance of the bituminous group's research is the prospect of utilizing a new and plentiful fuel source which, it is believed, will give an operating-mile cost lower than that obtainable with oil fired turbines, and in addition, will prove a new outlet for the harried bituminous producers.

The contracts placed with the two turbine producers were signed

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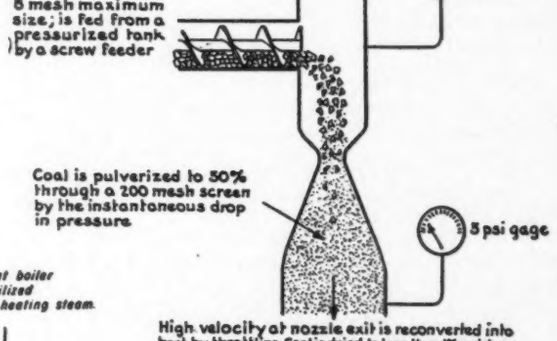
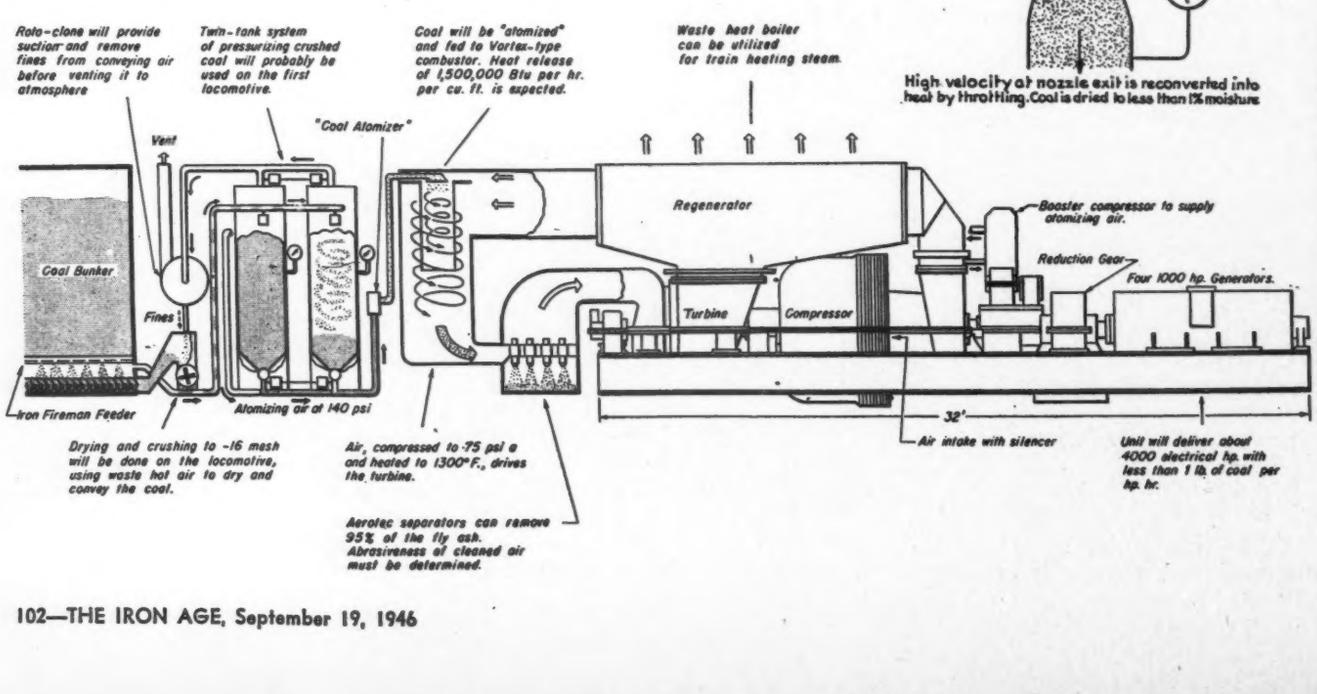
PULVERIZER: *Yellott unit for pulverizing coal for use as a gas turbine fuel, right. The schematic diagram below shows the arrangement of various components of the proposed coal-burning gas turbine.*

o o o


Air or steam at a Velocity of 50 to 100 feet per second
70 to 100 psi gage
Coal, crushed to 8 mesh maximum size; is fed from a pressurized tank by a screw feeder
Coal is pulverized to 50% through a 200 mesh screen by the instantaneous drop in pressure
5 psi gage
High velocity at nozzle exit is reconverted into heat by throttling. Coal is dried to less than 1% moisture


Roto-clone will provide suction and remove fines from conveying air before venting it to atmosphere
Twin-tank system of pressurizing crushed coal will probably be used on the first locomotive.
Coal will be "atomized" and fed to Vortex-type combustor. Heat release of 1,500,000 Btu per hr. per cu. ft. is expected.
Waste heat boiler can be utilized for train heating steam.
Vent
"Coal Atomizer"
Coal Bunker
Fines
Iron Fireman Feeder
Atomizing air at 140 psi
Regenerator
Booster compressor to supply atomizing air.
Reduction Gear
Four 1000 hp. Generators.
Turbine
Compressor
32'
Air intake with silencer
Unit will deliver about 4000 electrical hp. with less than 1 lb. of coal per hp. hr.
Drying and crushing to -16 mesh will be done on the locomotive, using waste hot air to dry and convey the coal.
Air, compressed to 75 psi a and heated to 1300° F., drives the turbine.
Aerotec separators can remove 95% of the fly ash. Abrasiveness of cleaned air must be determined.

by Bituminous Coal Research, Inc., on behalf of the Locomotive Research Committee. The latter is an organization established by a group of eastern coal carrying railroads and three major coal producers to develop a gas turbine locomotive.

The turbines to be built by Elliott and Allis-Chalmers will be rated at 3750 hp each and will be used to supply direct current for traction motors of two experimental locomotives. These locomotives will be rated at 3000 rail-hp and are expected to be in service within 2 yr.

Development of a gas turbine fired with powdered coal has hinged on the solution of two problems — suitable pulverization of the coal and removal of fly ash. The presence of fly ash in the high velocity gases of the turbine would cause rapid erosion of the turbine blades. Removal of fly ash in the new turbine units will be effected through use of Aerotec units (at right) which are expected to remove from 85 to 95 pct of the fly ash. Particles passing through these separators will contain no matter larger in size than 5 microns, a size which has been found to be relatively harmless to turbine blade material. The coal will be pulverized by a method developed by J. I. Yellott, director of research for the Locomotive Research Committee. A schematic illustration of the Yellott separator is shown at the left.

Use of powdered coal, in addition to giving a decided economic lift to soft coal producers and handlers, will eliminate smoke and cinders in locomotive operation. Coal to be used in the turbines will be taken on in the same size as is carried by present day steam locomotives, but will be reduced in size in special equipment carried by the turbine locomotive. The Allis-Chalmers plant will incorporate an axial flow compressor and will operate at a turbine entry temperature of 1300° F. Shaft efficiency is expected to be 24 pct. The Elliott unit will utilize a two-stage centrifugal compressor with turbine inlet temperature of 1275° F and an expected shaft efficiency of 22.5 pct. The schematic drawing on the preceding page shows the proposed arrangement of the various components of a coal-burning gas turbine locomotive, including the "atomizing" or pulverizing unit and the Aerotec fly ash separators.

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SEPARATOR: *The Aerotec separator which removes fly ash from the intake air. Fly ash has heretofore been a tough problem for gas turbine designers.*

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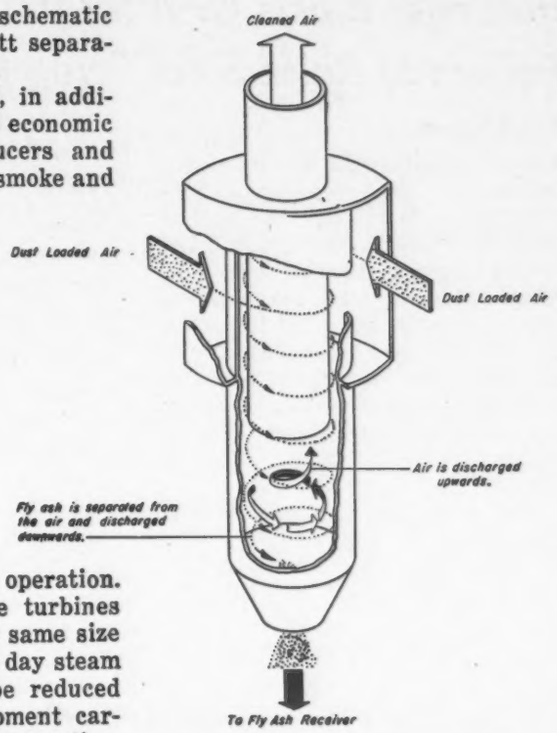
Cleaned Air
Dust Loaded Air
Dust Loaded Air
Air is discharged upwards.
Fly ash is separated from the air and discharged downwards.
To Fly Ash Receiver

A description of an Elliott turbine built for the Navy appeared in THE IRON AGE, *Aug. 2, 1945, p. 102. An Allis-Chalmers' unit was described in* THE IRON AGE, *Apr. 4, 1946, p. 121.—Ed.*

Break Seen in Canadian Steel Strike as Union Weakens on Pay Issue

Toronto

• • • **For the first time** since the Canadian steel strike commenced July 15, there appear to be indications of early settlement. Despite the fact that strikers at the Steel Co. of Canada Ltd., Hamilton, Algoma Steel Corp., Sault Ste. Marie, and Dominion Steel & Coal Co., Sydney, N. S., in open votes turned down the government's proposals of wage increases of 11 to 12½¢ per hr, C. H. Millard, national director of the United Steel Workers of America (CCL-CIO), stated that while the union had not retreated from its demand of a 15½¢ per hr wage increase, it was agreeable to accepting a 12½¢ boost across the board, provided it is fortified by other concessions that would bring the overall adjustment to the level demanded. He explained that the difference could be made up by pay for statutory holidays or double time for those who worked and other concessions, which includes union security.

The Canadian steel supply situation continues to become more acute, and industrial operations are slowing down at a rapid rate. While some production of steel is being maintained by some of the smaller plants, output from this source is only a drop-in-the-bucket compared with actual requirements. Imports from the United States have been stepped up, but again this betterment is far from sufficient to offset the loss of almost the entire supply from the three big basic mills in this country. Steel Co. of Canada has given most of its workers that remained on the job a holiday and production at the Hamilton works has been sharply reduced. However, the company has stockpiles in its yards of approximately 70,000 tons ready for shipment as soon as the strike is settled. Two blast furnaces are in operation at the Steel Company, as well as openhearth furnaces which are being kept in readiness to swing into full production as soon as the working staff returns from holiday.

New order placing has almost entirely dried up. Mills are said to be fully booked on any steel they can produce this year and are reluctant to add to backlogs. Consumers realizing the hopelessness of obtaining steel against new orders also are showing less interest in the market at this time.

Barringer Blasts OPA for Its Failure to Raise Steel Scrap Prices

Washington

• • • **If openhearths** go down this winter for lack of scrap the responsibility is wholly that of the Office of Price Administration, declared Edwin C. Barringer in commenting on the recent scrap action of the agency. Blasting the OPA for rejecting the recommendations of its own advisory committee, the president of the Institute of Scrap Iron & Steel accused the OPA of giving a legless man a single crutch.

Charging that the agency had substituted its judgment for that of the seasoned men of the industry, the scrap spokesman said:

"For the second time in 4 months the OPA has taken the position that the steel scrap situation does not warrant an increase in price. In the meantime, the supply situation has deteriorated rapidly, the OPA is undertaking a scrap drive, and steel furnaces have had to be taken out of operation, depriving the nation of steel so badly needed for housing and other reconversion purposes.

"Prior to OPA there never was a serious scrap shortage and no necessity for a public drive. Scrap dealers, consumers and producers, by cooperating, were able to solve their problems. The scrap industry only asked to be put in position to function effectively. The decision of OPA hobbles it all tighter.

"The OPA is requiring the scrap industry to function in 1946 on the basis of 1941 price levels. It refuses to recognize increased wage and other costs. The scrap industry's sense of obligation to the country and its customers will prompt it to make available every ton of scrap possible under the circumstances, but there is no law that compels an industry to operate at a loss.

"Charges of hoarding by scrap dealers are ridiculous. Undoubtedly during the long time the OPA has taken to make up its mind to reject the recommendations of its own advisory committee the movement of scrap has slowed down. But latest government statistics show that stocks of dealers are lower, on the average, than what was considered a safe working minimum during the war.

"Time is short. At this season consumers should be building up stocks for the winter months. Instead, the supply is dwindling and the scrap industry under the new regulations is handicapped more than at any time during the war period. The OPA will be wholly responsible if any steel mills go down this fall or winter for lack of scrap.

"Increases granted on the cast grades will help attract more scrap for foundries but much of their effectiveness is lost without a balancing increase in the steel grades. In effect, the OPA has given a legless man a single crutch."

Coming Events

Sept. 30-Oct. 3 American Society of Mechanical Engineers, Boston.

Oct. 1-4 Assn. of Iron & Steel Engineers, Iron & Steel Exposition, Cleveland Public Auditorium, Cleveland.

Oct. 3-4 Magnesium Assn. of America, New York.

Oct. 3-5 National Electronic Conference, Chicago.

Oct. 3-5 Society of Automotive Engineers, aeronautic meeting and display, Los Angeles.

Oct. 9-11 Porcelain Enamel Institute, University of Illinois.

Oct. 10-12 American Society of Tool Engineers, semi-annual convention, Pittsburgh.

Oct. 16-19 Electrochemical Society, fall congress, Toronto.

Oct. 23-26 National Tool & Die Manufacturers Assn., convention, Chicago.

Oct. 28 American Institute of Steel Construction, annual convention, Coronado, Calif.

Oct. 28-30 American Gear Manufacturers Assn., semi-annual meeting, Chicago.

Oct. 29-Nov. 1. Refrigerator Equipment Manufacturers Assn., exposition, Cleveland.

Nov. 7-8 National Founders Assn., New York.

Nov. 15-24 National Aircraft Show, first annual exposition, Cleveland.

Nov. 17-22 American Welding Society, annual meeting, Atlantic City, N. J.

Nov. 18-22 National Metal Congress and Exposition, Atlantic City, N. J.

Dec. 2-4 Society of Automotive Engineers, air transport meeting, Chicago.

Dec. 2-7 National Power Show, New York.

Dec. 5-7 Electronic Microscope Society of America and American Society for X-ray and Electron Diffraction, joint meeting, Pittsburgh.

Kitchenware Makers Are Given Time Extension

Washington

• • • **OPA has extended** the time allowed makers of cast iron and enamel kitchenware to reticket their products with new ceilings from Sept. 1 to Oct. 1.

In another action, effective Sept. 10, OPA granted a 15 pct increase over March 1942 ceilings for steel venetian blinds. This action, however, will not apply to manufacturers who have received individual adjustments unless such adjustments were lower than the new increases. Resellers may increase their prices by the same percentage.

The London ECONOMIST

The End of Let's Pretend

THOSE who try to explain the contentious surface of American-Soviet relations as indicating an American enmity toward Russia are on shifting sands. That a section of the American press sees international relations in terms of a boxing match, cheering "our Jimmy" when he scores against Molotov or booing him when he is scored against, should not obscure the fact that he is subject to something far more difficult to assess or direct than any single attitude. He has behind him a whole complex of attitudes and pressures, with relative strengths that are shifting and unpredictable. So far, no cohesive force has hardened that complex into anything so simple as a national will to fight or be friends with the Soviet.

Whether such hardening will come remains to be seen. In the last ten years Russia has performed a continuous Protean act, with shifts in make-up and costume coming so fast as to baffle outside observers, yet not in any one of her six major changes has American opinion been solidly for or against her. It has even been difficult to distinguish a consistent majority opinion, so strong have been the minority attitudes clustering around the official core which prevailed in Washington at the moment.

The present official core apparently dates from the spring meetings of the Council of Foreign Ministers, and columnists who do not often agree are going out of their way to explain that Secretary Byrnes is a patient man who arrived at it only after long experiment. In substance it is a new realism which views Russia neither as omniscient Utopia, immovable menace, nor gallant and injured innocent, but as an obstreperous young power with the tongue, if not exactly the vocabulary, of a Missouri mule skinner, given to Oriental rather than to Western logic, equipped with a battery of fixed ideas which, while very different from ours, may be coped with by a people as convinced of the importance of their own ends as she is of the importance of hers. At the moment, Secretary Byrnes is engaged in trying to cope, and his fellow countrymen in watching. Measurement of newspaper coverage shows the country interested as never before in what Russia does, what she looks like, what makes the big noise tick.

BUT this always happens when there is trouble in the air, and it does not necessarily mean that the country is in agreement. Peripheral opinions about Russia still range from the entrenched Catholic, which believes her to be the anti-Christ, to the convinced Communist, which finds in her every dogma an immaculate conception. There is no arguing with either of those groups; each has at times swayed important sectors of American opinion.

The first group includes a majority of the Catholic hierarchy (but not all of them) and a sizeable body of obedient communicants. With it, in attempts to direct national action against Russia, move those non-Catholics to whom the preservation of the capitalist system is at least as important as the preservation of established religion. Its aura of influence includes the more flamboyant isolationist editors and commentators, as well as others more soberly conservative, and it has had a large effect on Washington.

The second group is in itself more compact, smaller, even better disciplined, but its edges get fuzzy and its elastic penumbra has been stretched to include not only liberals but even the great middle-of-the-roaders. Ageing sentimentalists whose political illusions flowered when Lenin and Trotsky raised the banner of Utopia over Russia in 1917, younger liberals whose admiration dates from her support of the Spanish Republic in 1936, have gone in and out of that penumbra or hovered, sympathetic, on its edges. Most men of good will have at least been touched by it, until at times it was difficult to tell who was travelling with whom.

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

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A third group is now forming which is newer, larger, and more directly influential. On its support depends the power of the new official realism. The first two groups got their education in Russian matters and manners largely second hand, but this newer one has the advantage of first-hand experience. Some of them are soldiers and officers who have dealt with the Russians in Germany or Iran, some are civilians who saw the Soviet armies enter Hungary, some have been on embassy or consulate staffs, or members of technical commissions, part of whose function it was to engage in the competitive decision of vodka and work out specific problems. To them, who saw with their own eyes and heard with their own ears, must be added the hundreds of Americans who flocked to meetings of the Security Council in New York and watched Mr. Gromyko perform his variations on the "No" theme, and the thousands who heard it over the radio or saw it on the movie screen. For these, Russia's motives are still mysterious, but her behaviour in public is common knowledge, no longer susceptible to change through propaganda.

Yet the members of this newer group are no more limited than the others, in what they think about Russia. Some are sure that the peace of the world depends on our finding a way to get along with her, while agreeing with a returned correspondent that she does not want friendship and that "as a nation we have to live with the Russian nation in an atmosphere of bitterness and tension . . . there is no other way." Others think war between the United States and Russia is inevitable, that the only question

(CONTINUED ON PAGE 152)

AMERICAN IRON AND STEEL INSTITUTE

Production of Open Hearth, Bessemer and Electric Steel Ingots and Steel for Castings

YEAR 1946

Based on Reports by Companies which in 1945 made 97.6% of the Open Hearth, 100% of the Bessemer and 85.8% of the Electric Ingot and Steel for Castings Production

Period	Estimated Production—All Companies								Calculated weekly production, all companies (Net tons)	Number of weeks in month
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	3,528,090	51.1	207,512	47.4	136,452	29.2	3,872,054	49.6	874,053	4.43
February	1,300,944	20.9	25,905	6.6	65,668	15.6	1,392,517	19.8	348,129	4.00
March	5,946,698	86.2	363,949	83.1	196,400	42.0	6,507,047	83.3	1,468,859	4.43
1st Quarter	*10,775,732*	*53.8*	*597,366*	*47.0*	*398,520*	*29.4*	*11,771,618*	*51.9*	*915,367*	*12.86*
April	5,333,139	79.8	286,088	67.5	241,031	53.3	5,860,258	77.5	1,366,028	4.29
May	3,699,979	53.6	153,409	35.0	219,064	46.9	4,072,452	52.2	919,289	4.43
June	5,145,594	77.0	251,253	59.2	227,979	50.4	5,624,826	74.4	1,311,148	4.29
2nd Quarter	*14,178,712*	*69.9*	*690,750*	*53.7*	*688,074*	*50.1*	*15,557,536*	*67.9*	*1,195,814*	*13.01*
1st 6 months	*24,954,444*	*61.9*	*1,288,116*	*50.4*	*1,086,594*	*39.8*	*27,329,154*	*59.9*	*1,056,403*	*25.87*
* July	6,016,253	87.4	365,332	83.6	228,083	48.9	6,609,668	84.9	1,495,400	4.42
† August	6,261,941	90.7	373,819	85.4	259,705	55.6	6,895,465	88.3	1,556,538	4.43
September										4.28
3rd Quarter										*13.13*
9 months										*39.00*
October										4.43
November										4.29
December										4.42
4th Quarter										*13.14*
2nd 6 months										*26.27*
Total										52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,558,041 net tons open hearth, 98,849 net tons Bessemer and 105,491 net tons electric ingots and steel for castings, total 1,762,381 net tons; based on annual capacities as of January 1, 1946 as follows: Open hearth 81,236,250 net tons, Bessemer 5,154,000 net tons, Electric 5,500,290 net tons, total 91,890,540 net tons.

* Revised.
† Preliminary figures, subject to revision.

YEAR 1945

Based on Reports by Companies which in 1945 made 97.6% of the Open Hearth, 100% of the Bessemer and 85.8% of the Electric Ingot and Steel for Castings Production

Period	Estimated Production—All Companies								*Calculated weekly production, all companies (Net tons)	Number of weeks in month
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	*Net tons	*Percent of capacity	Net tons	Percent of capacity	*Net tons	*Percent of capacity	*Net tons	*Percent of capacity		
January	6,469,340	90.5	379,062	76.0	355,910	76.8	7,204,312	88.8	1,626,256	4.43
February	5,968,326	92.4	347,227	77.1	337,212	80.6	6,652,765	90.8	1,663,191	4.00
March	6,927,939	96.9	398,351	79.8	379,639	81.9	7,705,929	95.0	1,739,487	4.43
1st Quarter	*19,365,605*	*93.3*	*1,124,640*	*77.6*	*1,072,761*	*79.7*	*21,563,006*	*91.5*	*1,676,750*	*12.86*
April	6,541,627	94.5	372,952	77.2	375,308	83.6	7,289,887	92.8	1,699,274	4.29
May	6,664,117	93.2	402,100	80.6	383,450	82.7	7,449,667	91.8	1,681,640	4.43
June	6,129,763	88.5	379,807	78.6	330,952	73.7	6,840,522	87.1	1,594,527	4.29
2nd Quarter	*19,335,507*	*92.1*	*1,154,859*	*78.8*	*1,089,710*	*80.0*	*21,580,076*	*90.6*	*1,658,730*	*13.01*
1st 6 Months	*38,701,112*	*92.7*	*2,279,499*	*78.2*	*2,162,471*	*79.9*	*43,143,082*	*91.0*	*1,667,688*	*25.87*
July	6,318,975	88.6	381,832	76.7	284,764	61.6	6,985,571	86.3	1,580,446	4.42
August	5,172,344	72.3	347,088	69.5	215,885	46.6	5,735,317	70.7	1,294,654	4.43
September	5,435,799	78.7	352,847	73.2	193,829	43.3	5,982,475	76.3	1,397,775	4.28
3rd Quarter	*16,927,118*	*79.9*	*1,081,767*	*73.1*	*694,478*	*50.5*	*18,703,363*	*77.8*	*1,424,475*	*13.13*
9 months	*55,628,230*	*88.4*	*3,361,266*	*76.5*	*2,856,949*	*70.0*	*61,846,445*	*86.6*	*1,585,806*	*39.00*
October	5,146,787	72.0	242,122	48.5	207,867	44.8	5,596,776	69.0	1,263,381	4.43
November	5,641,308	81.5	358,664	74.2	200,494	44.7	6,200,466	78.9	1,445,330	4.29
December	5,523,277	77.4	343,266	68.9	191,394	41.4	6,057,937	74.8	1,370,574	4.42
4th Quarter	*16,311,372*	*76.9*	*944,052*	*63.8*	*599,755*	*43.6*	*17,855,179*	*74.2*	*1,358,842*	*13.14*
2nd 6 months	*33,238,490*	*78.4*	*2,025,819*	*68.5*	*1,294,233*	*47.1*	*36,558,542*	*76.0*	*1,391,646*	*26.27*
Total	71,939,602	85.5	4,305,318	73.3	3,456,704	63.4	79,701,624	83.5	1,528,608	52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,614,338 net tons open hearth, 112,658 net tons Bessemer and 104,640 net tons electric ingots and steel for castings, total 1,831,636 net tons; based on annual capacities as of January 1, 1945 as follows: Open hearth 84,171,590 net tons, Bessemer 5,874,000 net tons, Electric 5,455,890 net tons, total 95,501,480 net tons.

*Revised January through December, 1945.

WAA Announces New Disposals of Steel Plants and Facilities

Washington

• • • **WAA has announced** lease of the steel plant at Granite City, Ill., to the Granite City Steel Co., for 5 yr with an option to buy for $4,500,000. The Granite City Steel Co. has been operating the plant, producing steel plates. It is interlocked with the facilities of the company and will be used in the production of plates, sheets and strip steel, WAA said.

The disposal agency also announced that it had disposed of the Sheffield Steel Corp. plant, Houston, Tex., in part by sale and in part by lease to the Sheffield Co., a subsidiary of the American Rolling Mill Co. The plant has been under lease to the Sheffield Co. The portions sold include the openhearth and hot pot facilities and the price approved was $1,479,802. Proposed expansion of the openhearth facilities, WAA said, will increase the labor crew by 1000 persons.

The leased facilities at Houston include a blooming mill and a plate mill which produced plates and shells during the war. The annual rental of $500,000 a yr for a term of the 20 yr lease, it was pointed out, is 9.5 pct of the fair value of the facilities as fixed by WAA.

The bronze and aluminum castings plant at Springfield, Mass., operated during the war by the Reynolds Metals Co., was sold for $412,500 to the Indian Motorcycle Co., Springfield.

The Rochester, N. Y., armor plate plant, formerly operated by the Symington-Gould Corp., was leased for 5 yr to Sugars, Inc. The plant will be converted to the production of liquid sugars.

CPA Agrees to Cancel UNRAA Rated Orders To Aid Vets Housing

Washington

• • • **To prevent** possible interference with the veterans housing program, according to Civilian Production Administrator John D. Small and Housing Expediter Wilson W. Wyatt, UNRRA has agreed to cancel procurement in this country of woodworking machinery for its shelter program abroad. It has also agreed to postpone procurement of machines for the manufacture of cement blocks as well as certain other equipment used for the production of building materials.

It was stated that UNRRA's action followed a conference of its representatives with representatives of the State Dept. and the Treasury Dept's. Procurement Div.

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS

Period JULY - 1946

Steel Products	Number of companies	Items	Maximum Annual Potential Capacity Net Tons	Current Month: Production: Net Tons	Current Month: Production: Per cent of capacity	Current Month: Shipments (Net Tons): Total	Current Month: Shipments (Net Tons): To members of the industry for conversion into further finished products	To Date This Year: Production: Net Tons	To Date This Year: Production: Per cent of capacity	To Date This Year: Shipments (Net Tons): Total	To Date This Year: Shipments (Net Tons): To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	40	1	xxxx	xxxx	xxx	331,069	142,160	xxxx	xxx	1,813,410	828,085
Structural shapes (heavy)	12	2	9,421,550	343,667	46.9	313,100	xxxx	1,717,567	33.2	1,729,593	xxxx
Steel piling	4	3		31,171		26,423	xxxx	98,984		78,737	xxxx
Plates (sheared and universal)	28	4	17,080,770	463,288	32.0	428,393	29,004	2,195,818	22.1	2,165,254	146,212
Skelp	5	5	xxxx	xxxx	xxx	46,641	22,527	xxxx	xxx	198,674	94,435
Rails—Standard (over 60 lbs.)	4	6	3,657,000	179,440	57.9	163,275	xxxx	868,620	40.9	836,208	xxxx
—All other	5	7	392,000	16,018	48.2	16,798	xxxx	78,641	34.5	77,892	xxxx
Splice bars and tie plates	12	8	1,745,960	54,734	37.0	54,679	xxxx	315,804	31.1	334,152	xxxx
Track spikes	10	9	349,400	12,255	41.4	11,992	xxxx	72,855	35.9	77,363	xxxx
Hot Rolled Bars—Carbon	33	10	xxxx	647,865	xxx	516,244	61,469	3,514,391	xxx	2,879,542	353,819
—Reinforcing—New billet	15	11	xxxx	83,472	xxx	91,326	xxxx	486,184	xxx	530,057	xxxx
—Rerolled	12	12	xxxx	16,713	xxx	14,783	xxxx	77,554	xxx	77,030	xxxx
—Alloy	22	13	xxxx	162,640	xxx	131,359	10,763	857,719	xxx	710,341	67,872
—Total	39	14	22,009,660	910,690	48.8	753,712	72,232	4,935,848	38.6	4,196,970	421,691
Cold Finished Bars—Carbon	24	15	xxxx	114,961	xxx	112,654	xxxx	678,232	xxx	678,682	xxxx
—Alloy	23	16	xxxx	19,991	xxx	18,109	xxxx	119,899	xxx	106,008	xxxx
—Total	31	17	2,851,510	134,952	55.8	130,763	xxxx	798,131	48.2	784,690	xxxx
Tool steel bars	18	18	255,010	7,306	33.8	7,937	xxxx	58,896	39.8	59,280	xxxx
Pipe & Tubes—Butt weld	14	19	2,176,520	126,591	68.6	111,463	xxxx	712,685	56.4	687,773	xxxx
—Lap weld	9	20	730,200	28,874	46.6	27,612	xxxx	141,438	33.3	155,304	xxxx
—Electric weld	10	21	1,536,900	73,315	56.3	65,835	xxxx	397,755	44.5	335,789	xxxx
—Seamless	13	22	3,169,600	210,833	78.5	177,730	xxxx	1,123,064	61.0	989,921	xxxx
—Conduit (cap. & prod. incl. above)	6	23	xxxx	xxxx	xxx	8,907	xxxx	xxxx	xxx	47,012	xxxx
—Mech. tubing (cap. & prod. incl. above)	11	24	xxxx	xxxx	xxx	35,805	xxxx	xxxx	xxx	229,229	xxxx
Wire rods	25	25	7,293,670	353,396	57.2	84,470	28,838	2,271,334	53.6	541,194	192,431
Wire—Drawn	39	26	5,702,890	269,966	55.8	150,998	11,048	1,779,105	53.7	1,026,656	74,231
—Nails and staples	18	27	1,260,360	48,368	45.3	46,955	xxxx	302,996	41.4	304,102	xxxx
—Barbed and twisted	15	28	543,610	16,361	35.5	16,133	xxxx	114,759	36.3	113,518	xxxx
—Woven wire fence	15	29	1,121,860	29,730	31.3	29,874	xxxx	204,774	31.4	205,346	xxxx
—Bale ties	12	30	149,700	8,602	67.8	8,352	xxxx	46,018	52.9	48,645	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	57,124	295	xxxx	xxx	410,957	1,114
—Chemically treated	8	32	465,000	10,051	25.5	9,215	xxxx	76,076	28.2	72,208	xxxx
Tin and Terne Plate—Hot dipped	9	33	3,758,850	163,584	51.3	177,862	xxxx	974,005	44.6	1,041,161	xxxx
—Electrolytic	9	34	2,231,850	87,137	46.1	84,199	xxxx	476,648	36.8	489,022	xxxx
Sheets—Hot rolled	30	35	19,353,320	1,214,302	74.0	538,723	47,778	7,114,503	63.3	3,134,066	210,704
—Cold rolled	13	36	7,127,460	478,371	79.2	337,888	xxxx	*2,838,245	68.5	2,041,222	xxxx
—Galvanized	16	37	2,924,130	122,058	49.2	131,179	xxxx	769,679	45.3	781,411	xxxx
Strip—Hot rolled	25	38	7,180,030	221,408	36.4	131,655	26,234	1,239,807	29.7	775,900	128,143
—Cold rolled	34	39	3,067,450	98,873	38.0	92,127	xxxx	693,130	38.9	680,707	xxxx
Wheels (car, rolled steel)	5	40	315,400	21,493	80.4	19,442	xxxx	125,450	68.5	127,805	xxxx
Axles	6	41	398,170	11,815	35.0	10,722	xxxx	65,928	28.5	63,363	xxxx
All other	3	42	169,510	3,014	21.0	558	xxxx	24,024	24.4	3,064	xxxx
TOTAL STEEL PRODUCTS	140	43	xxxx	xxxx	xxx	4,639,610	380,116	xxxx	xxx	26,657,598	2,097,046
Effective steel finishing capacity	140	44	64,059,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	140	45	xxxx	xxxx	xxx	78.4 %	xxxx	xxxx	xxx	66.0 %	xxxx

* Adjusted.

Industrial Briefs . . .

• DIESEL ORDER — The Sterling Engine Co. has received a $1,500,000 order for Viking diesel engines and parts to power new streamlined diesel-electric locomotives developed and produced by the Whitcomb Locomotive Co., Rochelle, Ill. This is in addition to a previous order for $1,000,000 from Whitcomb, which is being filled at the Buffalo plant. Sterling's president Addison F. Vars announced that Viking diesel power plants are being sold for export to South America as well as to U. S. Railroads.

• AFA APPOINTMENTS — The board of directors of American Foundrymen's Assn. has announced the retirement of Charles E. Hoyt. who has held the offices of secretary, convention and exhibits manager, executive vice-president and treasurer, and the election of William W. Maloney, secretary of the association as Secretary-Treasurer. The board also announces the appointment of S. C. Massari as technical director and of John P. Mullen as assistant treasurer.

• FORMS COMPANY—Ray Miller, widely known specialist in corrosion, heat and chemical resistant materials, has formed his own company to market a complete line of pipe, valves, fittings and tubing in stainless steel, aluminum, plastics, and other resistant materials. The new company will be known as Ray Miller, Inc., with offices located at 54 Clinton St., Newark, N. J.

• BUYS GOVERNMENT PLANT — Chase Brass & Copper Co., Waterbury, Conn., has purchased for $5,012,522 the government owned plant operated by the company during the war. Price includes plant, some equipment and 95 to 100 acres of land.

• TO PROCESS SCRAP—B. Bloomfield Co., Worcester, Mass., scrap metal dealers, is making more space for processing scrap and erecting a factory for housing same.

• MORE POWDER — The Metals Refining Co., Chicago, subsidiary of the Glidden Co., has plans under way to double its plant capacity by modernization and addition of equipment. Metals Refining Co. is the largest producer of iron powders in the United States and is one of the three largest manufacturers of copper powder.

• BUYS PLANT — Monsanto Chemical Co. has purchased from the WAA the government-owned styrene plant, Texas City, Tex. The sale price of the plant, which Monsanto built and operated for the government under the wartime synthetic rubber program, was $9,550,000. The new addition is part of a program in which the company will expand its polystyrene plastic production to a rate of more than 80 million lb by early next year.

• FORMS RESEARCH FIRM — American Research & Development Corp. with a capital of $5,000,000 has been formed in Boston to finance selected projects, especially those projected during the war. Ralph E. Flanders, former president of the Federal Reserve Bank of Boston, is president. Brig. Gen. Georges F. Doriot, deputy director of research and development for the War Dept. general staff, is chairman of advisers. Directors include Karl T. Compton and Jerome C. Hunsaker of the Massachusetts Institute of Technology.

• CASE EXPANDS — The J. I. Case Co., Racine, Wis., has begun a $3 million program of modernization and expansion at its Rock Island, Ill., tractor and farm equipment plant.

• BARLOW-SEELING GROWS—The Barlow & Seeling Mfg. Co., Ripon, Wis., has plans for taking over part of the war plant of the Giddings & Lewis Machine Tool Co. at Fond du Lac, Wis., as part of its postwar expansion program.

WAA Issues Listing Of Sales and Sites

Washington

• • • **WAA has prepared** a 30-page descriptive volume of its surplus war products obtainable at sales at sites. The commodity listing may be inspected by prospective purchasers at WAA field offices. The listing alphabetically of site sale merchandise by commodities provides every facility to select the item desired and is segregated under 20 different commodity groupings. It shows just where and when in the United States the item may be found at a site sale.

The current listing contains an index of nearly 100 site sales, some of which include more than one sale site and which are conducted as a combined operation. It does not deal with any items which are earmarked for sale to veterans on a set-aside preference.

WAA plans to issue a new commodity listing every 30 days with an index listing: Merchandise, sale locations, priority buying periods for federal government, veterans, small business, state and municipalities, nonprofit institutions and nonpriority purchasers —all reported 1 month in advance of the listing's publication.

•

• • • **WAA's Real Property** Disposal Board has also approved the lease of the blast furnace plant at Daingerfield, Tex., to the Lone Star State Co., the war operator of the property. The lease extends to Jan. 31, 1947.

Part of the Victory Ordnance plant, Decatur, Ill., has been sold to the General Electric Co., Pittsfield, Mass. WAA said that General Electric plans to employ 500 persons to manufacture laminated and alkyd plastics.

Announces Pig Iron Bonus

Washington

• • • **Housing Administrator** Wilson W. Wyatt has announced that bonus payments on merchant pig iron will be $8 per ton for operating furnaces and $12 per ton for furnaces to be blown in. The bonuses apply to output in excess of established quotas and will be retroactive to Sept. 1. (THE IRON AGE, Sept. 12, p. 110.)

Construction Steel...

• • • **Fabricated steel awards** this week included the following:

8000 **Tons,** Boston, New England Telephone & Telegraph Co. exchange, to Bethlehem Steel Co., Bethlehem, Pa., through Turner Construction Co., Boston, engineers.

5000 **Tons,** New York, waterside station, Consolidated Edison Electric Co., to American Bridge Co., Pittsburgh.

4800 **Tons,** Kalamazoo, Mich., building for Upjohn Co., to Austin Co., Chicago.

4400 **Tons,** Cleveland, factory building for Perfection Stove Co., to American Bridge Co., Pittsburgh. Previously reported on inquiry as 3000 tons.

2000 **Tons,** State College, Pa., women's dormitory for State College, to American Bridge Co., Pittsburgh.

2000 **Tons,** Beaufort, S. C., government hospital, to Ingalls Iron Works Co., Birmingham.

1200 **Tons,** Schenectady, N. Y., research laboratory for General Electric Co., to American Bridge Co., Pittsburgh.

1000 **Tons,** Whitney and Mancado, Minn., two generator stations for Northern States Power Co., to Minneapolis Steel & Machinery Co.

1000 **Tons,** State of New Mexico, bridges, A-195 and B-62, Albuquerque Div., Atchison, Topeka & Santa Fe RR.

1000 **Tons,** Buffalo, Danahy Faxon, Inc., food warehouse and super market, to Lehigh Structural Steel Co., Allentown, Pa., through Turner Construction Co., New York.

900 **Tons,** Reading, Pa., building for Parish Pressed Steel Co., to Belmont Iron Works.

800 **Tons,** South Chicago, Ill., blast furnace repair Carnegie-Illinois Steel, to American Bridge Co., Pittsburgh.

675 **Tons,** Indianapolis, Ind., manufacturing building for Foster Engineering Co., to J. T. Ryerson & Son.

500 **Tons,** Sioux Falls, S. D., generator station, Northern States Power Co., to Minnesota Steel & Machinery Co.

490 **Tons,** Robinson, Ill., cracking tower, Ohio Oil Co., to American Bridge Co., Pittsburgh.

320 **Tons,** Edgemore, Del., manufacturing plant for E. I. du Pont de Nemours Co., to Bethlehem Fabricators, Bethlehem, Pa.

300 **Tons,** East Boston, hangar, office and service buildings for North East Airlines, Inc., to American Bridge Co., Pittsburgh, through Charles T. Main Co., Boston, engineers.

250 **Tons,** Florence, Ala., additions and alterations to Rogers Department Store, to Ingalls Iron Works Co., Birmingham.

220 **Tons,** Philadelphia, Frankford Elevated, Margaret-Orthodox Station, all bids rejected.

• • • **Fabricated steel inquiries** this week included the following:

19,000 **Tons,** Garden City, Kan., 2800 miles, 4 to 22-in. gathering system pipe for Stanolind Corp., Stone & Webster Engineering Corp., Boston, engineers.

2500 **Tons,** Newbridge, Del., plant for E. I. du Pont de Nemours Co., bids in.

1340 **Tons,** San Francisco, office building addition, for Pacific Gas & Electric Co.

1000 **Tons,** Vernon, Cal., General Mills storage silos, Bechtel Bros. & McCone, general contractors.

650 **Tons,** Wichita, Kan., warehouse for Innes Dry Goods Co.

420 **Tons,** North County, Pa., bridge for Pennsylvania Dept. of Highways, bids in.

400 **Tons,** Chicago, warehouse, United Motor Service Div., General Motors Corp.

325 **Tons,** Souderton, Pa., manufacturing and office building for Paulsboro Mfg. Co., bids due Sept. 20.

310 **Tons,** Kankakee, Ill., power house, low bidder, John Moroff & Son, Kankakee, Ill.

300 **Tons,** Chicago Heights, Ill., storage building for American Locomotive Co.

235 **Tons,** Imperial Co., Cal., two bridges, state project.

160 **Tons,** Toledo, building for E. I. du Pont de Nemours Co., bids in.

125 **Tons,** Carbon County, Pa., bridge for Pennsylvania Dept. of Highways, bids in.

• • • **Reinforcing bar awards** this week included the following:

1200 **Tons,** Boston, New England Telephone & Telegraph Co., exchange, to Bethlehem Steel Co., Bethlehem, Pa., through Turner Construction Co., Boston, engineers.

600 **Tons,** Beaufort, S. C., government hospital, to Ceco Steel Products Corp., Birmingham.

600 **Tons,** Celina, Tenn., power plant for Dale Hollow Dam, to Ceco Steel Products Corp., Birmingham.

200 **Tons,** Buffalo, Danahy Faxon, Inc., food warehouse and super market, to Truscon Steel Co., Cleveland, through Turner Construction Co., New York.

• • • **Reinforcing bar inquiries** this week included the following:

2700 **Tons,** Chicago, South Side intercepting sewer, low bidder S. A. Healy Co., original estimate was $5 million, low bid totaled $9,492,450.

2000 **Tons,** Boston, housing project.

450 **Tons,** St. Louis, sewer for St. Louis Board of Public Service, bids due Oct. 1.

143 **Tons,** Kankakee, Ill., power house for State of Illinois, low bidder John Moroff & Son, Kankakee, Ill.

125 **Tons,** New Orleans, power plant addition for New Orleans Public Service.

• • • **Plate awards** this week included the following:

3000 **Tons,** Chicago, 20 coal barges for Central Barge Co., Chicago, 10 to American Bridge Co., Pittsburgh, and 10 to Jeffersonville Boat Works, Jeffersonville, Ind.

• • • **Piling awards** this week included the following:

350 **Tons,** Havana, Ill., Z-piling for Illinois Power Co. to Bethlehem Steel Co., Bethlehem, Pa., for December delivery.

2000 **Tons,** Chicago, Atlantic Refining Co. has cancelled bearing pile contract placed with Carnegie-Illinois Steel Corp. Cancellation due to inability to furnish long lengths. Tonnage has been placed with Bethlehem Steel Co., for 95-ft long pieces.

Road Machinery Price Up

Washington

• • • **Manufacturers** of construction and road maintenance machinery and equipment were granted a price increase factor of 13.5 pct over base date prices by OPA on Sept. 17. The new increase factor replaces an interim increase factor of 10 pct allowed on Apr. 10, 1946.

At the same time, OPA authorized resellers of this equipment, which includes cranes, loaders, road maintainers, graders, mixers, payers and many similar products to pass on the manufacturers' price increase by increasing their prices the same percentage amounts as their costs are raised. The previous interim increase was also passed on in this way.

SWEET BUT SHORT: *Maybe John L. Lewis had a premonition that the coal negotiations, which it was hoped would result in the mines going back to industry control, would hit a snag. At any rate the meetings only lasted a few days when they were postponed indefinitely because of a split between the northern and southern operators. Pictured here from left to right are Charles O'Neill, mine operators representative, Admiral Ben Moreell, Coal Mines Administrator and John L. Lewis, UMW head.*

MACHINE TOOLS

. . . News and Market Activities

WAA Divides on Cutting Clayton Prices

• • • **On the somewhat** controversial subject of selling government-owned surplus machine tools at as much as 50 pct less than Clayton formula prices, two distinct schools of thought exist even within the hallowed confines of the War Assets Administration which obviously will do the selling.

Of the two schools, one might be called the selling group, which desires to cut the prices on those machines which they cannot move and which are in long supply. This category of equipment is also extended to include those machines which are of unusually large size and capacity and those with a multiplicity of attachments.

The other group, or policy school, is skeptical. This group feels that cutting the price will only serve as an interim expedient, and that one price cut will lead to another until tools are being sold for 10¢ on the dollar or even less. And it is with the policy group that the authority rests.

Many observers in the machine tool industry, which, incidentally, has not been given what might be termed an unlimited opportunity to express its feelings on the pending move, and men who have been selling machine tools for years, share the opinion of the policy group, pointing out that WAA is selling as many tools from surplus at the present time as the industry is selling new units. And, it is further pointed out, cutting prices is certainly not a move guaranteed to accelerate the machine tool market's movement in an upward direction.

At the present time, WAA considers that there are some 51,000 tools, an extremely small part of the surplus total, in long supply. This figure includes such items as 8000 milling machines, 3000 cylindrical grinders, and the like. Thus, it becomes immediately apparent that the secondary effect of price cutting is the thing to fear; that a price cut below Clayton formula will mean that it will be many a day before anyone gets formula price for a machine in "long supply" again.

WAA is definitely going to change the machine tool scrapping regulation, making it necessary to prove only that the machine tool to be scrapped was built 25 yr ago, and not that the machine has been in use 25 yr. This action, needless to say, will save a lot of trouble.

Reliable sources in the industry feel that WAA has bungled its relationship with the dealers pretty badly, and in some cases, made it appear that 12½ pct commission would best remain in the official family. It has also been pointed out that WAA has pretty well ignored the schools, who could absorb a good number of the "long supply" items.

Any action on a price reduction below Clayton formula levels will entail an amendment to Regulation 13 of the Surplus Property Act. WAA has always been free to negotiate sales of semi-special equipment or the like, and it is not impossible that much of the ado about price reduction has stemmed from some negotiated sales which have been misunderstood. There is also the report that WAA is accepting bids on certain lots of machines, presumably those in long supply, and when the agency receives what appears to be the highest bid, the new price is accordingly established. So go the rumors, and no one can be sure of any cuts in price until an amendment to Regulation 13 goes to the federal register.

Machine Tool Data

Cleveland

• • • Machine tool shipments in July amounted to $22,350,000, of which $7,800,000 went to foreign customers. Cancellations during the month totaled $2,500,000, of which $254,000 or 10.5 pct were from foreign buyers. Unfilled orders at the end of July amounted to $184,000,000 of which $53,800,000 or approximately 29 pct was foreign business. Data on new firm orders for July is not presently available, but approximations place new firm orders during the month well over $20,000,000, with about 20 pct received from foreign customers.

Machine tool builders in Cincinnati report production is at a standstill because of embargoes on shipments, both domestic and foreign. One builder has reported that all his side tracks are filled and machines are being stored in the yards.

Domestic buyers in this area are interested in getting machines with the latest style motors, and if these are not available, they are going to WAA for used models. Machine tool men, however, are not able to purchase the extensive electrical equipment needed for the new machines, and are, therefore, held off from 10 to 12 months on the latest models, which of course, turns orders to WAA.

Foreign ordering in the Cincinnati market is down to practically nothing, apparently because of the financial situations in the foreign countries and until finances are straightened out, no import licenses are being issued in many cases.

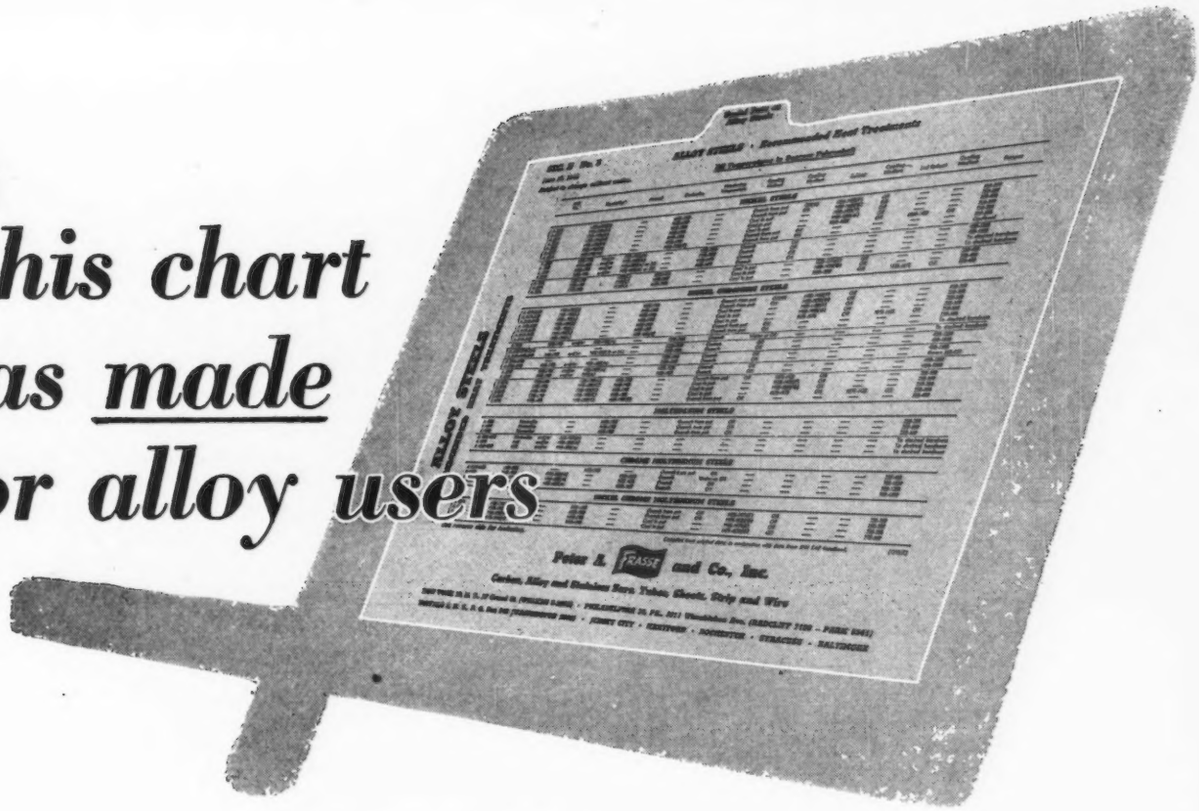
WAA reports that sales in the Cincinnati area for the period of Sept. 1 to Sept. 10 for metal forming and cutting equipment were $206,748.40.

Thirty-three million dollars worth of machine tools were offered for sale by WAA beginning Sept. 9 at Buffalo. The general public may buy any of the items offered, WAA said, in disclosing no priorities are needed, since these and similar items previously had been offered to priority claimants.

Fixed prices have been established for the merchandise, which includes lathes, grinders, drills, boring machines, vertical mills, polishers, gear shapers, tanks, testers, and numerous other machine tools.

Purchases must be paid for in cash unless credit previously has been established at the New York City regional office, 40 Wall St. Orders will be accepted only at the site, 2050 Elmwood Ave., Buffalo, with buyers paying any shipping charges from there to point of destination.

This chart was made for alloy users



In this new chart, Frasse has *condensed* alloy heat treat procedure to a *single* file size card. With it, you can check heat treatment for any one of 60 standard steels — in 30 seconds flat!

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NE 8630
A 8735
NE 8740
A 8742

NONFERROUS METALS

. . . News and Market Activities

Brass Mill Committee Walks Out on the CPA

Washington

• • • **Told on Sept. 11** that no price decision had been reached by CPA, the Brass Mill Advisory Committee adjourned its meeting and indicated it would not convene again until the Government took some action on urgently needed raw materials.

The CPA Brass Mill Advisory Committee resolution follows: "Recognizing its obligations to the CPA and industry and after consideration of the requirements of all basic industries, the Brass Mill Industry Advisory Committee of CPA feels that until an adequate supply of raw materials of proper grade is available and premiums are authorized for copper refinery shapes which will encourage the fullest use of existing capacity, no further meetings should be held. It moves that this meeting is adjourned."

The action was taken soon after the meeting had convened on Sept. 11. When CPA officials announced that no price decision had been reached, Committee members immediately halted the meeting and adopted the resolution.

•

Copper

• • • **Statistics issued** by the Copper Institute for August reveal that deliveries of refined copper jumped 22,000 tons during that month to a total of 118,814. This is the greatest tonnage to be shipped by producers since last November.

Of August refined copper tonnage, domestic copper comprised 66,105 tons and 52,709 tons came from Metals Reserve stocks. This domestic copper tonnage reflects the effect of the increasing production as a result of the termination of all strikes in domestic mines and refineries.

Production of unrefined copper during August increased over 7000 tons to a total of 64,209 tons. Refinery production increased during the month by 16,000 tons to a figure of 59,591 tons. Refinery inventories of copper dropped to 94,669 tons while blister stocks increased by 4618 tons.

•

Lead

• • • **The lead supply** position continues to be the most critical of the nonferrous metals with no consumers of lead receiving all requirements. It is known that some automobile manufacturers are of necessity shipping new cars without a storage battery due to the lead shortage. John Steelman, director of OWMR has stated categorically that the lead industry may expect no increase in ceiling prices. This action, calculated to influence lead scrap dealers and converters to market lead scrap and pig accumulated at the 9.50¢ OPA interim price, is believed by the trade not likely to be effective. Although the government contemplates the use of an inventory control mechanism to force the action, it is not apparrent to the industry how this could be worked out. Most producers have already sold all their October lead, except for the 25 pct set-aside which is required to be held for allocation by CPA. It is necessary for producers to sell lead by the twentieth of the preceding month, otherwise it is subject to allocation. Mexico, Canada and Peru are shipping lead to this country at the rate of about 7500 tons total per month. During the fourth quarter of the year, this volume of foreign lead should be significantly increased by shipments from Japan. Already it is reported that 420[illegible] tons have been loaded in Tokyo for shipment to this country.

•

Zinc

• • • **The trade is** expecting announcement of a modification of OPA ceiling prices on zinc which did not come in an anticipated announcement last week. Most producers have stopped making shipments of the lower cost grades since the time when OPA came back into action in late July, except on a few long term contract and in connection with what metal the Office of Metals Reserve makes available. However, the government is only releasing High Grade at this time. Consumers who require Prime Western have requested allocations of this grade from the government stockpile and if granted the metal is shipped from the nearest MR warehouse. Exports at the world zinc price are continuing by all producers from foreign ores converted in this country. Such shipments require export licenses and it is the belief of the trade that licenses would probably be denied if producers were to attempt to export zinc from domestic ores.

•

Expand Premium Plan

Washington

• • • **The Office of** Economic Stabilization has increased copper, lead and zinc subsidies.

Mines producing less than 600 tons of copper, lead or zinc in the twelve months ended June 30 are eligible for an exploration premium of 1¢ a pound of metal produced, up to a limit of $1000 a month per mine. For larger operators exploration premiums will not be considered as income.

To encourage development, an increase of 20 pct in development costs chargeable to operating cost will be permitted and larger allowances for depreciation and depletion retroactive to July 1.

Nonferrous Metals Prices

Cents per pound

	Sept. 11	Sept. 12	Sept. 13	Sept. 14	Sept. 16	Sept. 17
Copper, electro., Conn.	14.375	14.375	14.375	14.375	14.375	14.375
Copper, Lake, Conn.	14.375	14.375	14.375	14.375	14.375	14.375
Tin, Straits, New York	52.00	52.00	52.00	....	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25	8.25	8.25
Lead, St. Louis	8.10	8.10	8.10	8.10	8.10	8.10

Primary Metals

(Cents per ·, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$30.00
Cadmium, del'd	$1.25
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	14.375
Copper, electro, New York	14.125
Copper, lake, Conn. Valley	14.375
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$125.00
Lead, St. Louis	8.10
Lead, New York	8.25
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$99 to $101
Nickel, electro, f.o.b. refinery	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$83.00
Silver, New York, cents per oz.	90.125
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.69
Zirconium copper, 6 pct Zr, per lb contained Zr	$ 6.00

melted Metals

(Cents per lb)

Aluminum, No. 12 Fdy. (No. 2)	13.25 to 13.50
Aluminum, deoxidizing No. 3	12.25 to 12.75
Aluminum, deoxidizing No. 4	12.00
Brass Ingot—ceiling prices 85-5-5-5 (No. 115)	15.75
88-10-2 (No. 215)	19.00
80-10-10 (No. 305)	18.50
No. 1 Yellow (No. 405)	12.75

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded shapes	Rods	Sheets
Copper	25.66	....	25.81
Copper, H.R.	....	22.16	....
Copper drawn	....	23.16	....
Low brass, 80%	....	24.35	24.66
High brass	....	....	23.67
Red brass, 85%	....	24.67	24.98
Naval brass	23.34	22.59	28.53
Brass, free cut	....	18.53	....
Commercial, bronze	....	25.50	25.81
Manganese bronze	27.45	25.95	32.03
Phosphor bronze, A, B, 5%	....	43.70	43.45
Muntz metal	23.59	22.34	26.78
Everdur, Herculoy, Olympic or equal	....	29.82	30.88
Nickel silver, 5%	....	34.44	32.38
Architectural bronze	22.50	....	....

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢, 52S-O, 67¢ 24S-T, 71¢: base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb and over.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb and over.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 27.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢ 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18: 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base; B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢; B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

(Continued, See Next Column)

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb or more, 46¢ a lb; 25 to 90 lb, 56¢; less than 25 lb, 66¢.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	11.50
No. 1 tinned copper wire, No. 1 tinned heavy copper	11.50
No. 2 wire, mixed heavy copper	10.50
Copper tuyeres	10.50
Light copper	9.50
Copper borings, No. 1	11.50
No. 2 copper borings	10.50
Lead covered copper wire, cable	....*
Lead covered telephone, power cable	....*
Insulated copper	....*

OPA Group 2†

Bell metal	17.25
High grade bronze gears	15.00
High grade bronze solids	....*
Low lead bronze borings	....*
Babbitt lined brass bushings	14.75
High lead bronze solids	....*
High lead bronze borings	....*
Red trolley wheels	12.50
Tinny (phosphor bronze) borings	12.25
Tinny (phosphor bronze) solids	12.25
Copper-nickel solids and borings	11.00
Bronze paper mill wire cloth	11.25
Aluminum bronze solids	10.75
Soft red brass (No. 1 composition)	10.75
Soft red brass borings (No. 1)	10.75*
Gilding metal turnings	10.25
Contaminated gilded metal solids	10.25
Unlined standard red car boxes	10.00
Lined standard red car boxes	9.50
Cocks and faucets	9.50
Mixed brass screens	9.50
Red brass breakage	9.25
Old nickel silver solids	7.60
Old nickel silver borings	7.50
Copper lead solids, borings	6.75
Yellow brass castings	7.50
Automobile radiators	8.75
Zincy bronze solids, borings	9.75

OPA Group 3†

Fired rifle shells	9.50
Brass pipe	8.75
Old rolled brass	8.25
Admiralty condenser tubes	8.75
Muntz metal condenser tubes	8.25
Plated brass sheet, pipe reflectors	7.75
Manganese bronze solids	8.00[1]
Manganese bronze solids	7.00[2]
Manganese bronze borings	7.25

OPA Group 4†

Refinery brass	6.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 pct. [2] Lead content 0.41 to 1.00 pct.

Brass Mill Scrap†

Briquetted cartridge brass turnings	10.375
Cartridge brass turnings, loose	9.625
Loose yellow brass trimmings	9.625

Aluminum

Plant scrap, segregated

2S solids	10.00 to 10.50
Dural alloys, solids 14, 17, 18, 24S, 25S	8.00 to 8.50
turnings, dry basis	7.00 to 7.50
Low copper, alloys 51, 52, 61, 63S solids	9.50 to 10.00
turnings, dry basis	8.50 to 9.00

Plant scrap, mixed

Solids	8.00 to 8.50
Turnings, dry basis	7.00 to 7.50

Obsolete scrap

Old sheet and utensils	9.00
Old castings and forgings	8.00 to 8.50
Pistons, free of struts	8.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	7.50
Engravers, lithographers plates	7.50
Old zinc scrap	5.75
Unsweated zinc dross	6.00
Die cast slab	5.50
New die cast scrap	5.45
Radiator grilles, old and new	4.50
Old die cast scrap	4.00

Lead

Deduct 1.40¢ a lb from refined metal basing point prices for refinery charge on used battery plates.

Soft lead scrap	7.50

Nickel

Ni content 98+%, Cu under ½%, 23¢ per lb; 90 to 98% Ni, 23¢ per lb contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	29.75
Electrodeposited	23.47
Rolled, oval, straight, delivered	23.72
Curved, 18 in. or longer, delivered	23.72
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	27.25
Zinc, cast, 99.99, 15 in. or longer	17½
Nickel, 99 pct plus, frt allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	95⅞

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 1-5 bbls	34.00
Copper sulphate, 99.5, crystals, bbls	7.75
Nickel salts, single, 425 lb bbls, frt allowed	13.50
Silver cyanide, 100 oz lots, per oz.	0.749
Sodium cyanide, 96 pct, domestic, 125 lb drums	15.00
Zinc cyanide, 100 lb drums	33.00
Zinc sulphate, 89 pct, crystals, bbls, frt allowed	6.35

SCRAP

. . . News and Market Activities

CPA Allots Low Phos; Denies Overall Plan

New York

• • • **Despite the fact** that there were substantial allocations of low phos scrap to openhearths in the Cleveland and Chicago districts early this week CPA denies that any overall scrap allocation is contemplated. The denial was made in Washington on Sept. 16 by P. J. Treacy, head of the CPA steel division, who added that there would be no attempt to formalize allotments by overall allocation.

It was stated, however, that there definitely would be an overall inventory control over scrap, and it is known that CPA proposes to take on a staff of 600 to work on this angle. Regulations to control scrap inventories are being prepared and it is understood that they will be made effective Oct. 1. Mr. Treacy disagrees with the theory that inventory control would tie in with controlled distribution; he believes inventory control will encourage even distribution of scrap from yards to mills and foundries.

See pp. 95-98, 100 and 104 for additional scrap news.

Preliminary to such control some 400 or 500 agents from CPA and OPA will investigate supplies at yards, mills and foundries and subsequently will be in charge of controlling them.

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PITTSBURGH—Scrap still remains the No. 1 critical raw material item for mills in this area, although both mills and dealers indicate that an increase in offerings was evident the latter part of last week. Some sources feel this is the result of dealers having to meet some payrolls and should not be taken as any indication of a trend. OPA inspectors were in the area last week, forcing mills and dealers to regrade quite a number of cars of scrap.

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CHICAGO—Scrap shipments are up but the volume is not perceptible except in cast grades. Dealers are more than angry about OPA price action but are being forced to go along because of circumstances. It is the opinion here that cast grades might have gone higher if the ceilings had just been removed entirely, but that within 60 days would have leveled off lower than current prices. Mills which are receiving scrap from their customers will continue to do as this practice is of long standing and they don't believe that OPA has ample grounds to prosecute, even if it is evident that this custom has been widely expanded in recent months.

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DETROIT—As anticipated, scrap flow has increased substantially since the OPA scrap decision of Sept. 11 even though dealers find little to cheer about in the latest rulings. The fact that relief was not granted to compensate for increased preparation costs is perhaps the source of greatest disappointment. The feeling is growing here that many so-called experts have greatly exaggerated the amount of scrap that is available at any price and that scrap supply is bound to be tight for many months ahead and may, as a result of dislocations caused by the new ruling, become extremely critical in the Detroit area at the end of the year when yard operations are halted because of the weather.

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BOSTON—The new OPA setup leaves New England in the same unfavorable competitive position that has existed for years, and consequently is disappointing to the trade. The "controlled inventory" is a joke, say yardsmen. The boost in cast prices is considered meaningless because there is not enough cast to go around. Brokers maintain it will inspire bootlegging by peddlers. The movement of steel to mill is still unimportant.

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NEW YORK—Shipments of steel scrap staged a slight gain here as some withheld material was moved, but they involved only a few cars here and there. "Hoarded" scrap is not present in this area in significant tonnages although there is a fair amount of unprepared material lying about. Indications are that dealers here will not break their backs to move steel grades until finances demand it.

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PHILADELPHIA — The scrap trade here is aroused over the recent OPA scrap revisions and it is understood that the local chapter of the Scrap Institute met to consider a possible course of action. There are reports that there are many loopholes in the new order. Little scrap is moving under the new regulation and steel mills are disappointed in the failure to raise prices so that scrap production might be encouraged.

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CLEVELAND — Scrap shipments here ebbed to a pathetic trickle following OPA's refusal to grant a price increase and announcement of the new scrap program, which left some of the dealers pretty well stunned. The scrap supply situation is critical to the point that one major consumer has already been given an allocation, or permission, to continue to use electric furnace scrap in the openhearth. Cast scrap is moving, but the supply is so limited and the demand so great that numerous brokers have orders in at points as far away as New Mexico, $27.00 f.o.b.

BIRMINGHAM—Refusal of the OPA to allow increased prices for steel scrap has been greeted with anything but enthusiasm by members of the trade here and they predict that the action will reduce rather than boost the already slim shipments. It appears at present that dealers will make no effort to accumulate any stocks after inventories have been exhausted. Increased prices for cast may stimulate activity of auto wreckers but hardly enough to interest collectors of agricultural scrap since this is harvest time and crop prices are high.

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BUFFALO — Scrap dealers swallowed the bitter pill served up by the OPA in its latest price ruling, but they didn't like it and made no bones about it. Among the milder expressions of opinion was the comment that Washington had "gummed up the works again." The announcement released some withheld material although nothing like a rush developed. An unexpected cargo of 3500 tons of heavy melting was received by one consumer from Duluth late last week.

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CINCINNATI — The district iron and steel scrap market continues to be definitely tight, and recent action of OPA has not helped the situation at all. While there seems to be some feeling that here and there some hoarding is going on, this is not the general rule, and most dealers and brokers are moving material as fast as they can get it in an effort to keep their customers producing. Production scrap continues to be low, and country collections have not shown any improvement.

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ST. LOUIS—The action of the OPA in denying a higher ceiling on scrap iron prices was resented by factors in the trade here and the local chapter of the Institute of Scrap Iron adopted a resolution asking the advisory committee to resign as a protest. Dealers are carrying their resentment to the point of withholding shipments for the present and for a time it is expected that only such shipments as must move will be made. Mills are receiving about one-third of their daily requirements. Sheffield Steel Corp., Kansas City, whose four furnaces have been down because of the scrap shortage, is expected to put in three of them this week.

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TORONTO — The Canadian scrap iron and steel situation remains serious and dealers report no improvement in supply. Demand for iron grades has been gaining in volume as shortage of pig iron becomes more acute due to the steel strikes. Shipments of steel scrap to the mills at Hamilton and Sault Ste. Marie are still held up as raw materials are not permitted to pass the picket lines. While there has been some minor betterment in scrap offerings from the rural districts, no large tonnage deliveries have been reported, while at the same time there has been further slowing in offerings from industrial plants.

IRON AND STEEL SCRAP PRICES

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used they indicate the OPA ceiling price to which must be added brokerage fee and adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:
Cast grade f.o.b. shipping point

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	25.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Angles & splice bars	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Standard stl. car axles	25.75*
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
Rails 3 ft. and under	22.25*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	20.00*
RR. grate bars	15.25*
Cast iron brake shoes	17.75*
Stove plate	23.00*
Clean auto cast.	27.00*
Cast iron carwheels	22.00*

CINCINNATI

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	25.00*
Hvy. breakable cast.	20.00*
Stove plate	23.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
Nos. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast. chem. bor.	$13.06 to 14.15*
Machinery cast.	25.00*
Breakable cast.	20.00*
Stove plate	23.00*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.82*
No. 1 cupola cast.	25.00*
Charging box cast.	21.00*
Hvy. breakable cast.	20.00*
Stove plate	23.00*
Automotive cast.	27.00*

PHILADELPHIA

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	14.75*
Mixed bor. & turn.	13.75*
No. 1 cupola cast.	25.00*
Hvy. breakable cast.	20.00*
Cast. charging box	21.00*
Clean auto cast.	27.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	12.50*
Locomotive tires, uncut	21.00*
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft and under	21.50*
RR. springs	22.00*
Steel car axles	24.50*
Stove plate	23.00*
Grate bars	15.25*
Brake shoes	17.75*
RR. malleable	22.00*
Cast iron carwheels	22.00*
No. 1 mach'ery cast.	22.00*
Breakable cast.	20.00*

BIRMINGHAM

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	12.00*
Shoveling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	$18.50 to 19.50*
Structural and plate	18.50 to 19.50*
No. 1 cast.	25.00*
Stove plate	23.00*
Steel axles	18.50*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	22.00*

YOUNGSTOWN

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast.	25.00*
Hvy. breakable cast.	20.00*
Charging box cast.	21.00*
Stove plate	23.00*
Clean auto cast.	27.00*
Unstrip. motor blks.	20.00*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
Stove plate	23.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron carwheels	22.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machinery cast.	25.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	23.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:
Cast grade f.o.b. shipping point

RR. hvy. melting	$18.00*
No. 1 hvy. melting	17.00*
No. 2 hvy. melting	17.00*
No. 2 bales	$15.00 to 15.75
No. 3 bales	8.50 to 9.25
Mach. shop turn.	6.50 to 7.25
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:
Cast grade f.o.b. shipping point

RR. hvy. melting	$14.50*
No. 1 & No. 2 hvy. melting	14.50*
Elec. furn. 1 ft. und.	$14.00 to 15.00
No. 1 cupola cast.	25.00*

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in Heavy Type; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Sept. 17, 1946	Sept. 10, 1946	Aug. 13, 1946	Sept. 18, 1945
Hot-rolled sheets	2.425	2.425	2.425	2.20
Cold-rolled sheets	3.275	3.275	3.275	3.05
Galvanized sheets (24 ga.)	4.05	4.05	4.05	3.70
Hot-rolled strip				
6-in. and under	2.45	2.45	2.45	2.10
Over 6 in.	2.35	2.35	2.35	2.10
Cold-rolled strip	3.05	3.05	3.05	2.80
Plates	2.50	2.50	2.50	2.25
Plates, wrought iron	4.112	4.112	4.112	3.80
Stain's c-r strip (No. 302)	30.30	30.30	30.30	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.00	$5.00	$5.00	$5.00
Tinplate, electro (0.50 lb)	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.50	2.50	2.50	2.25
Cold-finished bars	3.10	3.10	3.10	2.75
Alloy bars	2.92	2.92	2.92	2.70
Structural shapes	2.35	2.35	2.35	2.10
Stainless bars (No. 302)	25.97	25.97	25.97	24.00
Wrought iron bars	4.76	4.76	4.76	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	3.05	3.05	3.05	2.75
Wire nails	3.75	3.75	3.75	2.90
Rails: (dollars per net ton)				
Heavy rails	$43.39	$43.39	$43.39	$43.00*
Light rails	49.18	49.18	49.18	45.00*
*per gross ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$39.00	$39.00	$39.00	$36.00
Sheet bars	38.00	38.00	38.00	36.00
Slabs, rerolling	39.00	39.00	39.00	36.00
Forging billets	47.00	47.00	47.00	42.00
Alloy blooms, billets, slabs	58.43	58.43	58.43	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.30	2.30	2.30	2.15
Skelp	2.05	2.05	2.05	1.90

Pig Iron*: (per gross ton)	Sept. 17, 1946	Sept. 10, 1946	Aug. 13, 1946	Sept. 18, 1945
No. 2 foundry, Phila.	$30.43	$30.43	$30.43	$26.84
No. 2, Valley furnace	28.50	28.50	28.50	25.00
No. 2, Southern, Cin'ti.	27.80	27.80	27.80	25.44
No. 2, Birmingham	24.88	24.88	24.88	21.38
No. 2 foundry, Chicago†	28.50	28.50	28.50	25.00
Basic, del'd eastern Pa.	29.93	29.93	29.93	26.34
Basic, Valley furnace	28.00	28.00	28.00	24.50
Malleable, Chicago†	28.50	28.50	28.50	25.00
Malleable, Valley	28.50	28.50	28.50	25.00
L. S. charcoal, Chicago	42.34	42.34	42.34	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.
* Prices retroactive to May 29; the price increase should be reflected in THE IRON AGE Comparison of Prices table since June 4.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	25.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	25.00	20.00	20.00	20.00
No. 1 cast, Chicago	25.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$8.75	$8.75	$7.50	$7.50
Foundry coke, prompt	8.50	8.50	8.50	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	14.375	14.375	14.375	12.00
Copper, Lake, Conn.	14.375	14.375	14.375	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	8.10	8.10	8.10	6.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Sept. 17, 1946	2.73011¢ per lb.	$28.13 per gross ton	$19.17 per gross ton
One week ago	2.73011¢ per lb.	$28.13 per gross ton	$19.17 per gross ton
One month ago	2.73011¢ per lb.	$28.13 per gross ton	$19.17 per gross ton
One year ago	2.44076¢ per lb.	$24.61 per gross ton	$19.17 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1946	2.73011¢ July 4	2.54490¢ Jan. 1	$28.13 May 29	$25.37 Jan. 1	$19.17	$19.17
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	$19.17 Jan. 2	$18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

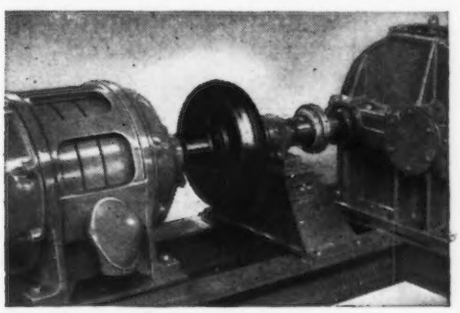
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

It's all done with OIL!

Performance right out of this world! In an automobile, you ride with effortless ease as if on a cloud. In a power plant of a giant utility, mechanical draft fans rotated at precise yet constantly changing speeds moving the flames up through the boilers at the exact rate required for maximum efficiency.

In merchant ships, tugs, and ocean liners, giant Diesel



Gyrol Fluid Drive

engines transmit their power as smoothly as a purring turbine. And it's all done with oil—in Gyrol Fluid Drive.

There is no metal-to-metal contact . . . no complicated machinery . . . no transmission of torsional vibrations from driving to driven shafts with Fluid Drive. More than 70 million horsepower are now being driven through this improved method!

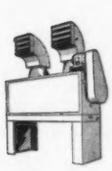
Our experience dates back to the introduction of Gyrol Fluid Drive to American industry. We will gladly share the benefits of this experience with you, and place our complete facilities at your disposal for the application of Fluid Drive to your needs. Just phone the nearest American Blower Branch. Ask also about American Blower Air Handling Equipment for cooling, conveying, collecting materials from air.

AMERICAN BLOWER

AMERICAN BLOWER CORP. DETROIT 32, MICH.

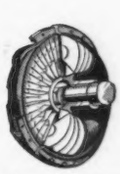
Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER — HEAT · DRAFT · AIR-CONDITIONING · FLUID DRIVES · DUST COLLECTORS

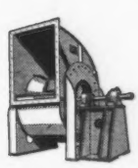


Heating Equipment

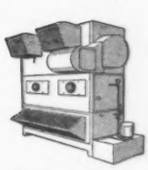
Ventilating Equipment



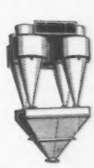
Gyrol Fluid Drive



Industrial Fans



Air Conditioners



Dust Collectors

4 Years of War-Stimulated Improvement—On Top of 61 Years of Engineering Development

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15¢ per lb higher.

Basing Points	Pitts-burgh	Chicago	Gary	Cleve-land	Birm-ingham	Buffalo	Youngs-town	Spar-rows Point	Granite City	Middle-town, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Phila-delphia
INGOTS															
Carbon, rerolling	($33.00 f. o. b. mill)														
Carbon, forging	$38	$38	$38	$38	$38	$38	$38								
Alloy	$48.69	$48.69				$48.69	(Bethlehem, Massillon, Canton, Coatesville=$48.69)								
BILLETS, BLOOMS, SLABS							(Provo=$50.20, Duluth=$41[14])								
Carbon, rerolling	$39	$39	$39	$39	$39	$39	$39	$39				$51[14]	$41		
Carbon, forging billets	$47	$47	$47	$47	$47	(Provo=$58.20, Duluth=$49[14]) $47	$47					$59[14]	$49		
Alloy	$58.43	$58.43				$58.43	(Bethlehem, Massillon, Canton=$58.43)						$60.43		
SHEET BARS	$38	$38		$38		$38	$38	$38	(Canton=$38)						
PIPE SKELP	2.05¢	2.05¢					2.05¢	2.05¢	(Coatesville=2.05¢)						
WIRE RODS [15] No. 5 to 9/32 in.	2.30¢	2.30¢		2.30¢	2.30¢		(Worcester=2.40¢)				2.55¢	2.80¢			
SHEETS															
Hot-rolled	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.525¢	2.425¢		2.975¢	2.525¢	2.685¢	2.615¢
Cold-rolled [1]	3.275¢	3.275¢	3.275¢	3.275¢		3.275¢	3.275¢		3.375¢	3.275¢		3.925¢	3.375¢	3.615¢	3.635¢
Galvanized (24 gage)	4.05¢	4.05¢	4.05¢		4.05¢	4.05¢	4.05¢	4.05¢	4.15¢	4.05¢		4.60¢		4.31¢	4.24¢
Enameling (20 gage)	3.80¢	3.80¢	3.80¢	3.80¢			3.80¢		3.90¢	3.80¢		4.45¢	3.90¢	4.20¢	4.16¢
Enameling (10 Gage)	3.20¢	3.20¢	3.20¢	3.20¢			3.20¢		3.30¢	3.20¢		3.85¢	3.30¢	3.60¢	3.56¢
Long ternes [2]	4.05¢	4.05¢	4.05¢									4.80¢		4.45¢	4.41¢
STRIP															
Hot-rolled [3] 6 in. and under	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢		2.45¢			2.45¢		3.10¢	2.55¢	2.85¢	2.81¢
Hot-rolled [3] over 6 in.	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢		2.35¢			2.35¢		3.00¢	2.45¢	2.75¢	2.71¢
Cold-rolled [4]	3.05¢	3.15¢		3.05¢			3.05¢	(Worcester=3.25¢)					3.15¢	3.45¢	3.41¢
Cooperage stock	2.55¢	2.55¢			2.55¢		2.55¢							2.95¢	
TINPLATE															
Standard cokes, base box	$5.00	$5.00	$5.00		$5.10			$5.10	$5.10					$5.375	$5.301
Electro, box 0.25 lb	$4.35	$4.35	$4.35					$4.35							
Electro, box 0.50 lb	$4.50	$4.50	$4.50					$4.60	$4.60						
Electro, box 0.75 lb	$4.65		$4.65					$4.75	$4.75						
BLACKPLATE 29 gage [5]	3.30¢	3.30¢	3.30¢					3.40¢	3.40¢					3.67¢	3.59¢
TERNES, MFG. Special coated, base box	$4.30	$4.30	$4.30					$4.40	$4.40						
BARS								(Duluth=2.60¢)							
Carbon steel	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	(Provo, Utah=3.20¢)			2.85¢	3.15¢	2.60¢	2.84¢	2.86¢
Rail steel [6]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢					2.85¢	3.15¢			
Reinforcing (billet) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢			2.70¢	2.75¢	2.45¢	2.61¢	2.69¢
Reinforcing (rail) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢				2.70¢	2.75¢	2.45¢		
Cold-finished [8]	3.10¢	3.10¢	3.10¢	3.10¢		3.10¢	(Detroit=3.15¢)				(Toledo=3.25¢)			3.44¢	3.46¢
Alloy, hot-rolled	2.92¢	2.92¢				2.92¢	2.92¢	(Bethlehem, Massillon, Canton=2.92¢)					3.02¢		
Alloy, cold-drawn	3.62¢	3.62¢	3.62¢	3.62¢		3.62¢							3.73¢		
PLATE								(Coatesville and Claymont=2.50¢, Provo, Utah=3.20¢)							
Carbon steel [13]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢			2.85¢	3.05¢	2.72¢	2.71¢	2.558¢
Floor plates	3.75¢	3.75¢									4.10¢	4.40¢		4.15¢	4.15¢
Alloy	3.79¢	3.79¢			(Coatesville=3.79¢)						4.27¢	4.49¢		4.01¢	3.895¢
SHAPES Structural	2.35¢	2.35¢	2.35¢		2.35¢	2.35¢	(Bethlehem=2.35¢)				2.70¢	3.00¢		2.54¢	2.48¢
SPRING STEEL, C-R [16]															
0.26 to 0.50 carbon	3.05¢			3.05¢			(Worcester=3.25¢)								
0.51 to 0.75 carbon	4.65¢			4.65¢			(Worcester=4.85¢)								
0.76 to 1.00 carbon	6.65¢			6.65¢			(Worcester=6.85¢)								
1.01 to 1.25 carbon	9.03¢			9.03¢ [17]			(Worcester=9.23¢)								
WIRE [9]															
Bright [12]	3.05¢	3.05¢		3.05¢	3.05¢		(Worcester=3.15¢)			(Duluth=3.10¢)		3.55¢		3.44¢	3.41¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.00¢	4.00¢		4.00¢			(Worcester=4.10¢)			(Trenton=4.25¢)		4.50¢		4.39¢	4.339¢
PILING Steel sheet	2.65¢	2.65¢				2.65¢						3.20¢		2.99¢	3.01¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	22.99	24.67	17.01	17.47	20.69	25.29
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.05	25.97	20.02	20.56	24.34	29.75
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.05	25.97	20.02	20.56	24.34	29.75
Plates, P'gh, Middletown, Canton	31.38	29.21	23.28	23.80	28.67	33.00
Shapes, structural, P'gh, Chi	27.05	25.97	20.02	20.56	24.34	29.75
Sheets, P'gh, Chi, Middletown, Canton, Balt	38.95	38.79	28.67	31.38	35.16	38.49
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.43	23.28	18.39	18.93	25.97	37.87
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.46	30.30	23.80	24.34	34.62	56.26
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila.	27.05	25.97	20.02	20.56	24.34	29.75
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Newark, N. J., Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 in. to 8 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, O.)*

An increase of 8.2 pct applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	per lb
Field grade	3.90¢
Armature	4.25¢
Electrical	4.75¢
Motor	5.425¢
Dynamo	6.125¢
Transformer 72	6.625¢
Transformer 65	7.625¢
Transformer 58	8.125¢
Transformer 52	8.925¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., net ton	$43.39
Angle splice bars, 100 lb	2.85
(F.o.b. basing points)	*per net ton*
Light rails (from billets)	$49.18
Light rails (from rail steel)	49.18
	base per lb
Cut spikes	3.65¢
Screw spikes	*5.15¢
Tie plate, steel	2.55¢
Tie plates, Pacific Coast	2.70¢
Track bolts	6.50¢
Track bolts, heat treated, to railroads	6.75¢
Track bolts, jobbers discount	63-5

*Plus 12 pct.

Basing points, light rails, Pittsburgh, Chicago, Birmingham: cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$8.50	$17.00
15-lb coating I.C.	9.50	19.00
20-lb coating I.C.	10.00	20.00

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Pa.	21.00*	22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	18.72	....
Inconel-clad		
10 pct, f.o.b. Coatesville	26.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.96	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	base per keg	
Standard wire nails	$3.75	$4.25
Coated nails	3.75	4.25
Cut nails, carloads	4.85	....
	base per 100 lb	
Annealed fence wire	$3.50	$4.00
Annealed galv. fence wire	3.85	4.35
	base column	
Woven wire fence*	72	90
Fence posts, carloads	74	91
Single loop bale ties††	72	97
Galvanized barbed wire**	79	89
Twisted barbless wire	79	89

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

††Add 50c a ton.

HIGH TENSILE, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	Hi Steel	Mayari R	Otis-coloy	Yoloy	Y-50
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	American Rolling Mill
Plates	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	....
Sheets									
Hot-rolled	3.575	3.575	3.575	3.575	3.575	3.575	3.575	3.575	.....
Cold-rolled	4.525	4.525	4.525	.....	4.525	4.525	4.525	4.525	5.225*
Galvanized	.....	.....	.....	.....	.....	5.50	.....	.....	.....
Strip									
Hot-rolled									
Over 6-in.	3.60	3.60	3.60	.....	3.60	3.60	3.60	3.90	.....
6-in & under	3.70	3.70	3.70	.....	3.70	3.70	3.70	3.70	.....
Cold-rolled	4.30	.....	4.30	.....	4.40	.....	4.30	4.30	5.00*
Commodity	.....	.....	.....	.....	.....	.....	4.45	.....	.....
Shapes	.....	3.45	.....	.....	3.45	3.45	3.45	3.45	.....
Beams	.....	3.45	.....	.....	.....	3.45	.....	.....	.....
Bars									
Hot-rolled	3.70	3.70	3.70	.....	.....	3.70	3.70	3.732†‡	.....
Cold-rolled	.....	.....	.....	.....	.....	.....	.....	4.382†‡	.....
Bar shapes	.....	3.85	.....	.....	3.85	3.85	3.85	3.85	.....
Billets, blooms, slabs (per gross ton)									
Structural	.....	.....	.....	.....	.....	.....	.....	$74.65†	.....
Forging	.....	.....	.....	.....	.....	.....	.....	$82.23†	.....

* 21 gage and lighter. † Alloy extras apply. ‡ Add 0.379¢ for forging grade, heat treated.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe)
Base price—$200.00 per net ton

Steel (buttweld)

	Black	Galv.
½-in.	60½	48
¾-in.	63½	52
1-in. to 3-in.	65½	54½

Wrought Iron (buttweld)

⅛-in.	17⅞	+4⅝
¼-in.	24¼	2⅝
1-in. and 1¼-in.	28⅝	9⅛
1½-in.	33	11⅞
2-in.	32⅝	11⅝

Steel (lapweld)

2-in.	58	46½
2½-in. and 3-in.	61	49½
3½-in. to 6-in.	63	51½

Wrought Iron (lapweld)

2-in.	24⅞	4⅞
2½-in. to 3½-in.	25⅞	7½
4-in.	28⅛	11⅝
4½-in. to 8-in.	27	10¼

Steel (butt, extra strong, plain ends)

½-in.	58½	47½
¾-in.	62½	51½
1-in. to 3-in.	64	54

Wrought Iron (same as above)

½-in.	18⅞	+1⅝
¾-in.	25⅝	4¾
1-in. to 2-in.	33	13

Steel (lap, extra strong, plain ends)

2-in.	56	45½
2½-in. and 3-in.	60	49½
3½-in. to 6-in.	63½	53

Wrought Iron (same as above)

2-in.	28⅛	8⅝
2½-in. to 4-in.	34	16¼
4½-in. to 6-in.	32⅝	14⅝

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots

	Seamless Cold-Drawn	Seamless Hot-Rolled	Lap-weld, Hot-Rolled
2 in. O.D. 13 B.W.G.	16.52	13.90	13.20
2½ in. O.D. 12 B.W.G.	22.21	18.70	17.67
3 in. O.D. 12 B.W.G.	24.71	20.79	19.56
3½ in. O.D. 11 B.W.G.	31.18	26.25	24.68
4 in. O.D. 10 B.W.G.	38.68	32.56	30.55

(Extras for less carload quantities)

40,000 lb or ft and over.....Base
30,000 lb or ft to 39,999 lb or ft.... 5 pct
20,000 lb or ft to 29,999 lb or ft....10 pct
10,000 lb or ft to 19,999 lb or ft....20 pct
5,000 lb or ft to 9,999 lb or ft....30 pct
2,000 lb or ft to 4,999 lb or ft....45 pct
Under 2,000 lb or ft.....65 pct

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in., del'd Chicago	$70.33
6-in. to 24-in., del'd New York	69.60
6-in. to 24-in., Birmingham	61.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles or Seattle for all rail shipment; rail and water shipment less	84.40

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

An increase of 12 pct applies to listings except Large Rivets

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

	Consumer
Packages, nuts loose	71 and 10
In packages	71
In bulk	80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets
(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$4.75
F.o.b. Lebanon, Pa.	4.90

Small Rivets
(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws *(In packages)*	Percent Off List Consumer
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.45
Old range, non-bessemer	5.30
Mesaba, bessemer	5.20
Mesaba, non-bessemer	5.05
High phosphorus	5.05

Prices are for ore shipped on and after June 24, 1946, and for ore covered by adjustable pricing agreements authorized by Order No. 8, RMPR 113.

These prices do not reflect the recent ICC increase in freight rates.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	19¼¢ to 21½¢
Copper, electrolytic, 100 and 375 mesh	23½¢ to 27½¢
Copper, reduced, 150 and 200 mesh	22¾¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	25¢ to 31¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	17¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	25¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	$1.75
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	13¼¢ to 16¾¢
Manganese, minus 325 mesh and coarser	44¢ to 61¢
Nickel, 150 mesh	51½¢
Silicon, minus 325 mesh and coarser	26¢ to 55¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb	$2.65
Under 100 lb	$2.90

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$8.75
Connellsville, Pa., hand drawn.	9.35
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.50
Foundry, Byproduct	
Chicago, del'd	15.10
Chicago, f.o.b.	14.35
New England, del'd	16.04
Kearny, N. J., f.o.b.	14.40
Philadelphia, del'd	14.63
Buffalo, del'd	14.75
Portsmouth, Ohio, f.o.b.	12.85
Painesville, Ohio, f.o.b.	13.50
Erie, del'd	14.50
Cleveland, del'd	14.55
Cincinnati, del'd	14.60
St. Louis, del'd	15.10†
Birmingham, del'd	12.25

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of $15.60 in the St. Louis Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	Per 1000
Super-duty brick, St. Louis	$76.05
First quality, Pa., Md., Ky., Mo., Ill., Ohio	60.40
First quality, New Jersey	65.90
Sec. quality, Pa., Md., Ky., Mo., Ill.	54.80
Sec. quality, New Jersey	57.70
Sec. quality, Ohio	52.95
Ground fire clay, net ton, bulk	8.95

Silica Brick	
Pennsylvania and Birmingham	$60.40
Chicago District	69.30
Silica cement, net ton (Eastern)	10.60

Chrome Brick	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	22.00
in sacks	26.00

Clinker (dead burned) dolomite, per ton East, $9.30; Midwest, add 10¢; Mo. Valley, add 20¢.

WAREHOUSE PRICES

Delivered metropolitan areas, per 100 lb.

Cities	SHEETS			STRIP			Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
				Hot-Rolled										
	Hot-Rolled (10 gage)	Cold-Rolled	Galvanized (24 gage)	6 in. and Under	Over 6 in.	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A-8617-20	Hot-Rolled, A-8742-50 Ann.	Cold-Drawn, A-8617-20	Cold-Drawn, A-8742-50 Ann.
**Philadelphia	$3.774	$5.139	$5.249[a]	$4.314	$4.214	$5.064	$3.875	$3.937	$4.114	$4.564	$6.287	$7.387	$7.664	$8.764
New York	3.856	4.869	5.501	4.375	4.275	5.075	4.049	4.038	4.134	4.584	6.338	7.438	7.684	8.784
Boston	4.05	5.031	5.725	4.518	4.418	4.985	4.203	4.023	4.356	4.656	6.503	7.603	7.756	8.856
Baltimore	3.64	5.118	5.365	4.293	4.193	....	3.865	4.05	4.093	4.543	....	....	....	....
Norfolk	4.037	....	5.862	4.577	4.477	....	4.262	4.303	4.377	4.677	....	....	....	....
Chicago	....	....	....	....	....	4.90[6]	....	....	....	4.20	....	6.90	....	....
Milwaukee	3.633	4.583	5.558	4.108	4.008	5.058[6]	3.958	3.958	3.908	4.358	6.308	7.408	7.458	8.558
Cleveland	3.575	....	5.347	3.95	3.85	....	3.65	3.88	3.60	4.20	6.277	7.377	7.20	8.30
Buffalo	3.575	4.625	5.20	4.211	4.111	4.961	3.921	3.85	3.60	4.20	6.05	7.15	7.20	8.30
Detroit	3.675	4.725	5.491	4.05	3.95	....	3.900	3.952	3.70	4.25	6.421	7.521	7.55	8.65
Cincinnati	3.671	4.721	5.296	4.046	3.946	5.002	3.952	3.983	3.902	4.502	6.441	7.541	7.602	8.702
St. Louis	3.643	4.593	5.622	4.118	4.018	5.222	3.968	3.968	3.918	4.522	6.472	7.572	7.622	8.722
Pittsburgh	3.575	4.625	....	3.95	3.85	....	3.65	3.65	3.60	4.20	6.05	7.15	7.20	8.30
St. Paul	3.817	4.767	5.666	4.292	4.192	5.000	4.142	4.142	4.092	4.852	....	6.322	7.952	8.052
Duluth	3.817	4.767	5.666	4.292	4.192	....	4.142	4.142	4.092	....	6.472	6.572	....	....
Omaha	4.045	5.72	6.00	4.52	4.42	....	4.37	4.37	4.32	4.945	....	....	....	....
Indianapolis	3.775	4.825	5.40	4.15	4.05	5.03	3.92	3.92	3.87	4.47	6.17	....	7.32	....
Birmingham	3.675	....	5.20	4.05	3.95	....	3.80	3.80	3.75	4.954	6.414	7.514	7.564	8.614
Memphis	4.221	....	5.746	4.596	4.496	....	4.346	4.346	4.296	4.821	....	....	....	....
New Orleans	4.324*	5.365[1]	5.849	4.699	4.599	....	4.449	4.449*	4.399*	5.14	....	....	....	....
Los Angeles	4.85	6.60[1]	6.55	5.30	5.20	....	4.80	4.70	4.65	6.03	....	....	....	....
San Francisco	4.40	6.00	6.55	4.85	4.75	....	4.50	4.35	4.40	5.78	....	....	....	....
Seattle	4.87[5]	7.27[2]	6.40	4.60	4.50	....	5.00[5]	4.70[5]	4.60[5]	6.23	7.70[8]	8.70[8]	....	9.55[8]
Portland	4.87[4]	....	6.20	5.10	....	....	5.00[4]	4.70[4]	4.70[4]	5.98	7.70	8.85	....	....
Salt Lake City	4.81	....	6.70	5.94	5.84	....	5.29	5.29	5.19	6.49	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars, 1500 lb base.

ALLOY BARS: 1000 to 39,999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 450 to 3749 lb; (4) 300 to 4999 lb; (5) 300 to 10,000 lb; (6) 2000 lb and over; (7) 3500 lb and over; (8) 1000 lb and over.

[a] Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

* Add 29.1¢ for sizes not rolled in Birmingham.

** City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Per gross ton, retroactive to May 29.

BASING POINT PRICES					
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	29.00	29.50	30.00	30.50	.....
Birdsboro	29.00	29.50	30.00	30.50	34.00
Birmingham	23.50*	24.88*	.....	29.50	.....
Buffalo	27.50	28.50	29.00	29.50	34.00
Chicago	28.00	28.50	28.50	29.00	.....
Cleveland	28.00	28.50	28.50	29.00	.....
Detroit	28.00	28.50	28.50	29.00	.....
Duluth	28.50	29.00	29.00	29.50	.....
Erie	28.00	28.50	29.00	29.50	.....
Everett	29.00	29.50	30.00	30.50	.....
Granite City	28.00	28.50	28.50	29.00	.....
Hamilton	28.00	28.50	28.50	.....	.....
Neville Island	28.00	28.50	28.50	29.00	.....
Provo	26.00	26.50	.....	.....	.....
Sharpsville	28.00	28.50	28.50	29.00	.....
Sparrows Point	29.00	29.50	.....	.....	.....
Steelton	29.00	.....	.....	.....	34.00
Swedeland	29.00	29.50	30.00	30.50	.....
Toledo	28.00	28.50	28.50	29.00	.....
Youngstown[1]	28.00	28.50	28.50	29.00	.....

DELIVERED PRICES (BASE GRADES)							
Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	29.50	30.00	30.50	31.00	.....
Boston	Birdsboro-Steelton	4.47	.....	.....	.....	.....	38.47
Brooklyn	Bethlehem	2.78	31.78	32.28	32.78	33.28	.....
Brooklyn	Birdsboro	3.26	.....	.....	.....	.....	37.28
Canton	Clev. Ygstn, Sharpsvil.	1.54	29.54	30.04	30.04	30.54	.....
Canton	Buffalo	3.55	.....	.....	.....	.....	37.55
Cincinnati	Birmingham	4.30	27.80*	29.18*	.....	.....	.....
Cincinnati	Hamilton	1.24*	.....	.....	29.74	.....	.....
Cincinnati	Buffalo	4.89	.....	.....	.....	.....	38.89
Jersey City	Bethlehem	1.70	30.70	31.20	31.70	32.20	.....
Jersey City	Birdsboro	2.16	.....	.....	.....	.....	36.16
Los Angeles	Provo	5.25	31.25	31.75	.....	.....	.....
Los Angeles	Buffalo	16.33	.....	.....	.....	.....	50.33
Mansfield	Cleveland-Toledo	2.16	30.16	30.66	30.66	31.16	.....
Mansfield	Buffalo	3.74	.....	.....	.....	.....	37.74
Philadelphia	Swedeland	0.93	29.93	30.43	30.93	31.43	.....
Philadelphia	Birdsboro	1.38	.....	.....	.....	.....	35.38
San Francisco	Provo	5.25	31.25	31.75	.....	.....	.....
San Francisco	Buffalo	16.33	.....	.....	.....	.....	50.33
Seattle	Provo	5.25	31.25	31.75	.....	.....	.....
Seattle	Buffalo	16.33	.....	.....	.....	.....	50.33
St. Louis	Granite City	0.50 Arb.	28.50	29.00	29.00	29.50	.....
St. Louis	Buffalo	7.86	.....	.....	.....	.....	41.86

* Republic Steel Corp. has been granted a $2 increase on basic and foundry pig iron produced at Birmingham.

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace. Delivered to Chicago, $42.34.

High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorous content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$34.00; f.o.b. Buffalo—$35.25. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.05	6.30	6.60
Ton lots	6.65	7.55	8.55
Less ton lots	6.80	7.80	8.80

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Manganese Metal

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10% max. C, 0.06% P, 90% Mn	21.00	21.40	21.65
0.10% max. C	20.50	20.90	21.15
0.15% max. C	20.00	20.40	20.65
0.30% max. C	19.50	19.90	20.15
0.50% max. C	19.00	19.40	19.65
0.75% max. C, 7.00% max. Si	16.00	16.40	16.65

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05
Ton lots	6.70
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet.	5.80
Ton lots	6.30
Less ton lots	6.55

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $51.25 f.o.b. Keokuk, Iowa; $48.00 f.o.b. Jackson, Ohio; $49.25 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots, packed.

	Eastern	Central	Western
96% Si, 2% Fe	13.10	13.55	16.50
97% Si, 1% Fe	13.45	13.90	16.80

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si.

	Eastern	Central	Western
Carload, bulk	3.60	3.75	3.90
Ton lots	4.05	4.55	4.60
Less ton lots	4.45	4.80	4.85

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
50% Si	7.05	7.50	7.65
75% Si	8.55	8.70	9.25
80-90% Si	9.50	9.65	10.15
90-95% Si	11.80	11.95	12.40

Ferrochrome

(65-72% *Cr*, 2% *max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.50	21.90	22.50
0.50% C	21.00	21.40	22.00
1.00% C	20.50	20.90	21.50
2.00% C	19.50	19.90	20.50
66-71% Cr, 4-10% C	14.50	14.90	15.00
62-66% Cr, 5-7% C	15.05	15.45	15.55

Briquets — contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.20	9.50	9.90
Ton lots	9.80	10.30	11.80
Less ton lots	10.10	10.60	12.10

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66.71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	15.60	16.00	16.10
Ton lots	16.65	17.30	18.50
Less ton lots	17.30	17.95	19.15

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.35
Less ton lots	22.00	22.65	23.35

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed. 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Chromium—Copper

Contract price, cents per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si.

Shot or ingot	45¢

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots	17.00	17.85	19.60

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1¢ for central zone; 5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.35	$1.75	$4.25
Less ton lots	1.60	2.00	5.00

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	12.00	12.75	14.75
Less ton lots	12.50	13.25	15.25

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	11.75	12.50	14.50
Less ton lots	12.25	13.00	15.00

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	12.00	12.85	14.60
Less ton lots	12.50	13.35	15.10

Other Ferroalloys

Ferrotungsten, standard, lump or ¼X down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed	$1.88
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb.	
Ton lots	$2.35
Less ton lots	$2.30
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads	$142.50
Ferrophosphorus, 18%, electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, Electrolytic, 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	14¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	4.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload	5.75¢
Ton lots	7.25¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	8.00¢
Ton lots	8.75¢
Less ton lots	9.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed. Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

carload lots	25¢
Ton lots	26¢

Silvaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Carload lots	58¢
Ton lots	59¢

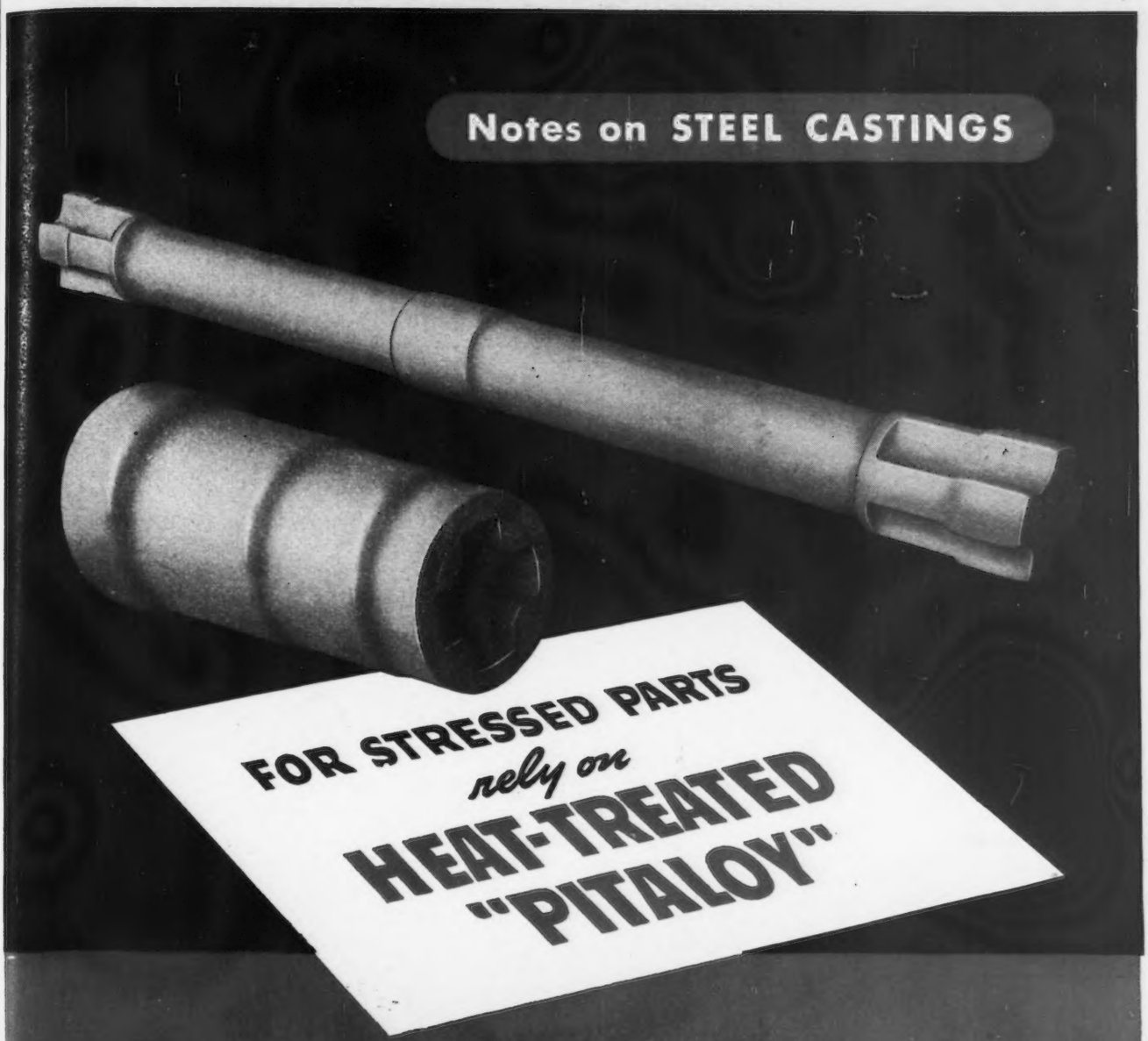
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Notes on STEEL CASTINGS



FOR STRESSED PARTS
rely on
HEAT-TREATED
"PITALOY"

Illustrated above are a Coupling Box and Spindle for a 40" Blooming Mill, heat treated to proper Brinell on all wearing surfaces. These parts were cast from "Pitaloy", an alloy steel developed by PSF which has ideal qualities for this type of application—the tough strength required to absorb heavy driving stresses, combined with the ability to assume high surface hardness under heat treatment. • Here's just another instance: first, of the tremendous utility of *modern* steel castings; second, of PSF's capacity to handle any kind or size of job, and any finishing requirements. *Put your steel casting needs up to PSF!*

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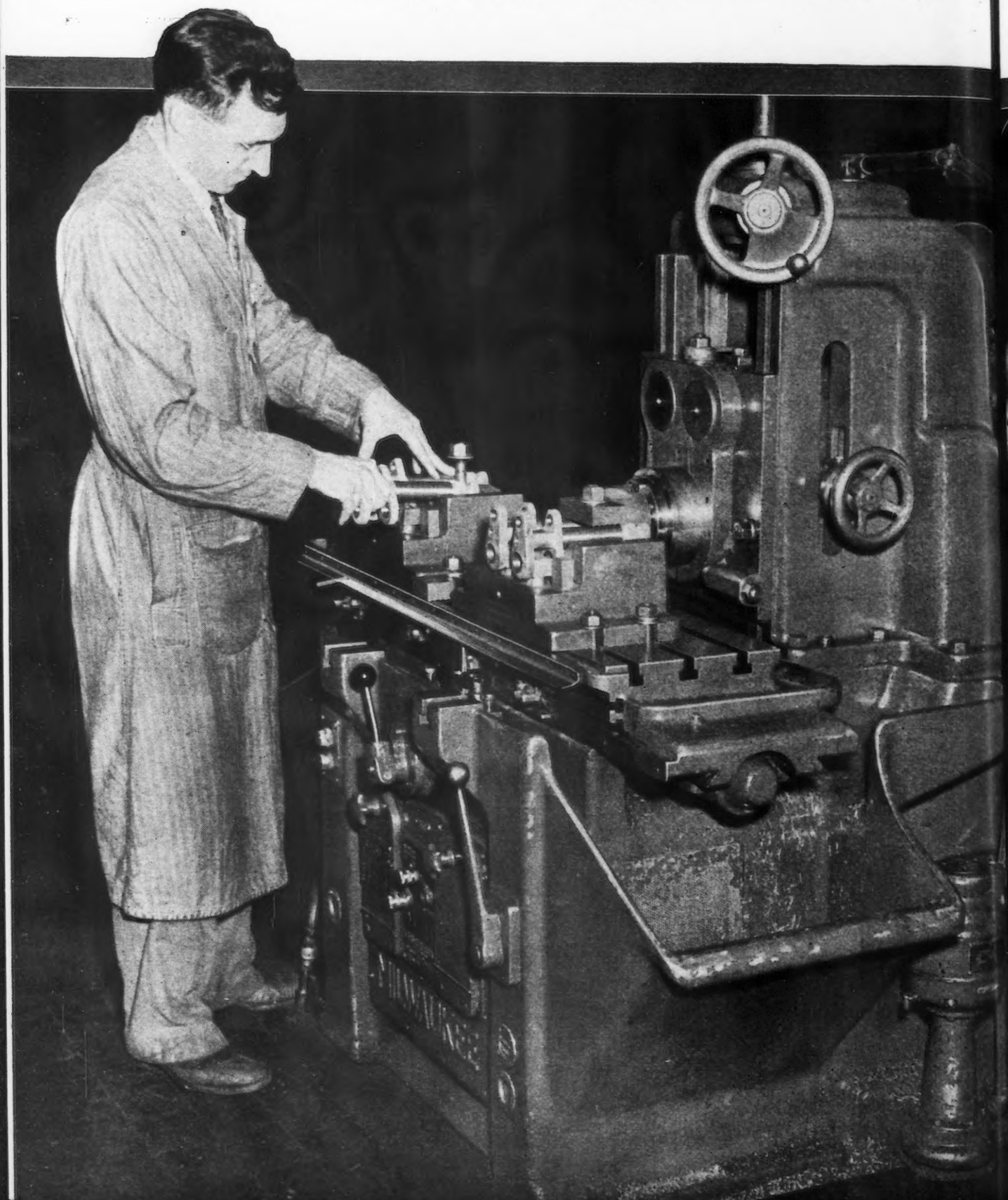
YOU CAN GET MINIMUM I

with *CONTINUOUS* Automatic Two-way Cutting Cycle on the KEARNEY & TRECKER M-24 Simplex Milling Machine



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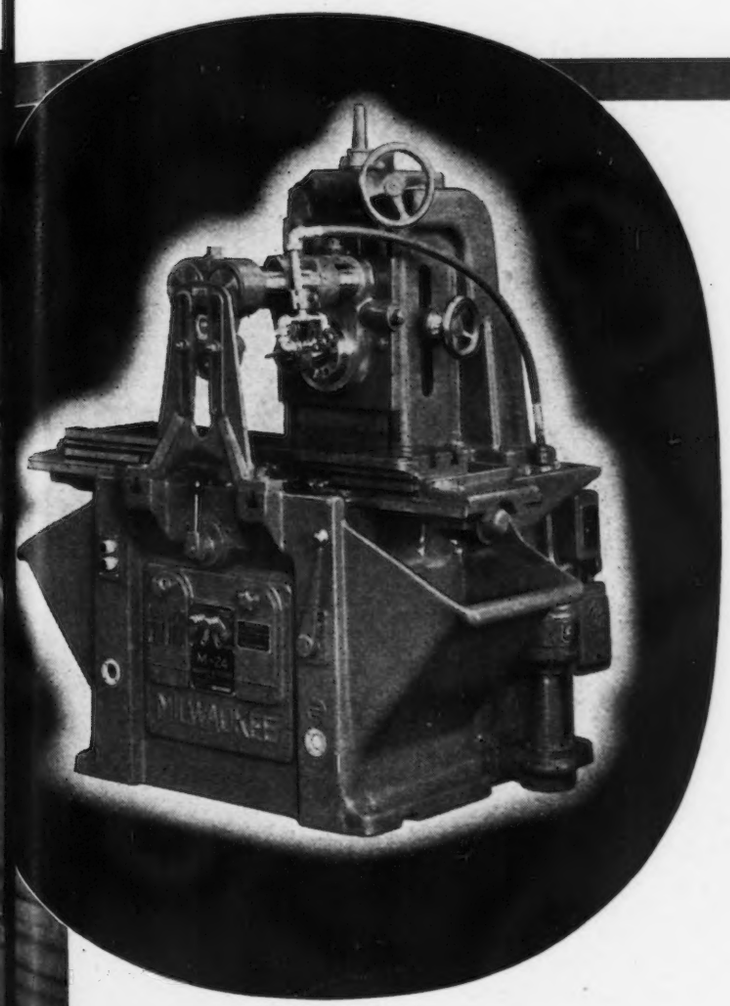
IDLE TIME...

The Kearney & Trecker M-24 Simplex milling machine permits continuous operation with minimum idle cutter time. Cast steel rods shown here being milled to length. Operation is speeded up by use of twin work holding fixtures, each accommodating two workpieces. A carbide steel milling cutter is applied on a continuous, automatic two-way cutting cycle. Automatic hydraulic controls for the table movement make the M-24 Simplex ideally suited to this job.



Kearney & Trecker M Series machines perform a wide variety of milling operations on small or medium-sized parts. Being equipped with a completely automatic and manual control system, they are readily adaptable to long or short run jobs.

CHECK THESE FEATURES

Three bearing spindle, double overarms, arbor supports and outer arm brace assure maximum rigidity and accuracy.

Climb cutting equipment is standard—includes an adjustable nut and a fixed nut on a ground table feed screw to eliminate backlash in both directions.

Pick-off speed and feed gears available for two speed ranges and three feed ranges to meet individual requirements.

Simplified directional controls assure ease of operation.

Built-in coolant and chip disposal system.

The compact construction of M Series machines reduces the necessary floor space to a minimum. Convenient table height facilitates setup and loading operations. The machines are available with either 18", 24" or 30" of power feed to table.

Write for complete data on M-24 Machines — BULLETIN No. B10A. *Please indicate your business connection.*

KEARNEY & TRECKER CORPORATION

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FREE EDUCATIONAL BOOKS

Easy-to-understand, well illustrated, the Milling Practice Series of Booklets are useful reference manuals on milling machine care, operation, and applications. The following are available on request; write on your business letterhead: Book One — Right and Wrong in Milling Practice; Book Two — The Milling Machine and Its Attachments; Methods of Cam Milling.

Sure Cure For "Box Jitters"

Loading 18-foot long boxes into a freight car is quite a problem in itself . . . especially when each box weighs half a ton. It's enough to give anyone "box jitters." But the Magee Carpet Company, Bloomsburg, Pa., devised a solution to this problem that cut loading time two-thirds and completely eliminated lost time accidents and injuries.

A rigid crane arm and tongs attachment, installed on a Towmotor Lift Truck, is the secret. Boxes are lifted by the tongs, swung deftly and quickly into place and stacked four high. In loading the top box, one end is set on the third box; the other end is then raised and the box is eased into balanced position. Using a pusher attachment of special design, the box is then nudged into place by Towmotor.

This same Towmotor, with attachments quickly removed, performs normal lift truck service about the plant, unloading and stacking raw wool, transporting rugs and carpets of all sizes and shapes.

For every handling problem, however unusual, there is an engineered solution . . . a solution based on Towmotor experience and "know-how" gained in solving handling problems in every industry. Send for your copy of the Lift Truck ANALYSIS GUIDE today. Towmotor Corporation, 1230 East 152nd Street, Cleveland 10, Ohio.

TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG

AAF Studying Weapons For Future Use Said To Dwarf Atomic Bomb

Washington

• • • **Potential weapons** for future use which they say may prove even more effective than the atomic bomb are being studied by Army Air Forces Ordnance engineers. A War Dept. announcement said that the AAF technicians are concentrating on entirely new weapons and methods of aerial warfare, scrapping most of the equipment used in the last war.

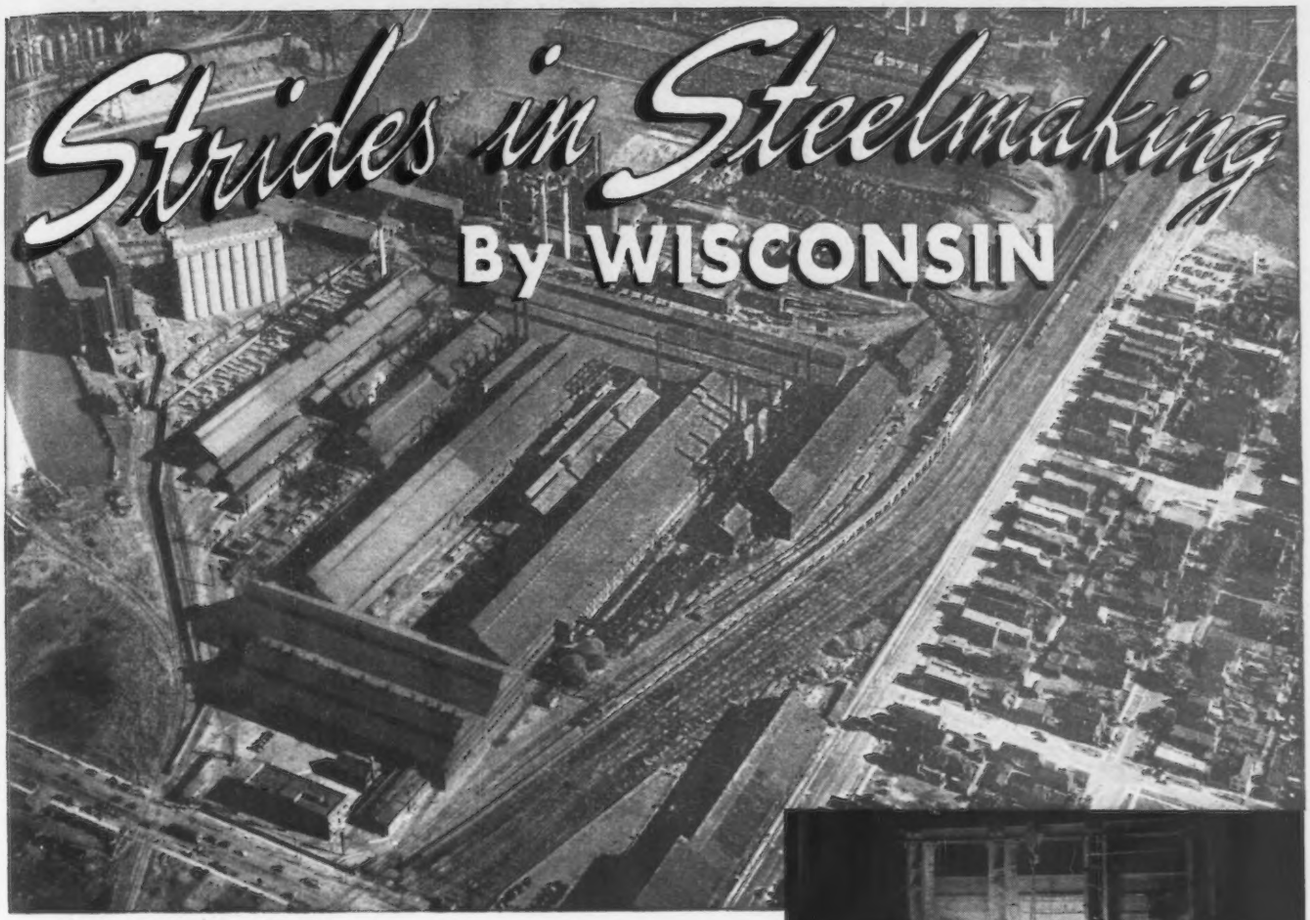
Even the atomic bomb, newest weapon in the arsenal of the AAF, might never be used in a future war, the researchers suggested, for one or more of these reasons: (1) International agreements might outlaw it; (2) both sides in a future war might hesitate to use it because of the fear of reprisals, much the same as the use of poison gas was forestalled in World War II; and (3) counter-measures against atomic attack might become developed before another war.

Security requirements forbid revelation of details of new weapons, but it was disclosed by the AAF that a small group of highly-skilled civilian engineers and AAF officers in the Air Ordnance Division was reviewing hundreds of reports and surveys from all over the world, seeking better weapons and methods to be used by the Army Air Forces. Ideas and innovations advanced by this group are sent to Wright Field, Ohio, and the Army Ordnance Proving Ground for further development.

The AAF engineers pointed out that the development of new type weapons cost millions of dollars, and that private industry, even though cooperating fully with military needs and requirements, could not be expected to bear all the expense of this development or to provide all the necessary scientific and technical knowledge.

It is therefore necessary, the statement said, that Air Ordnance engineers devise methods which can be given to the private manufacturer for production under contract. With a free exchange of information between the services and private industry, the AAF researchers are able to fill the needs of the AAF for the newest of

Strides in Steelmaking By WISCONSIN



● Two great strides in steelmaking are *Sulfite-Treated Steel,* the more machinable steel, and *"H" Steels,* alloy steels of guaranteed hardenability.

Sulfite-Treated Steel, originated and developed by Wisconsin metallurgists, has proven itself to be far more machinable than ordinary steel even after being hardened by heat-treatment. Yet its physical properties are entirely satisfactory. In every application where machinability counts, increased production and lowered costs have been the result.

"H" Steels are alloy steels produced to your "product prescription." This means that "H" Steels have a much narrower hardenability band *guaranteed.* Wisconsin has been a leader in the development of these steels and at present is the largest producer of "H" Alloy Steels.

Wisconsin's completely integrated operations from ore and coal mines to the finished steel, staffed by top-flight steelmakers, are your assurance of excellence in alloy and special steels. Our sales and metallurgical staffs are at your service.

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WISCONSIN STEEL

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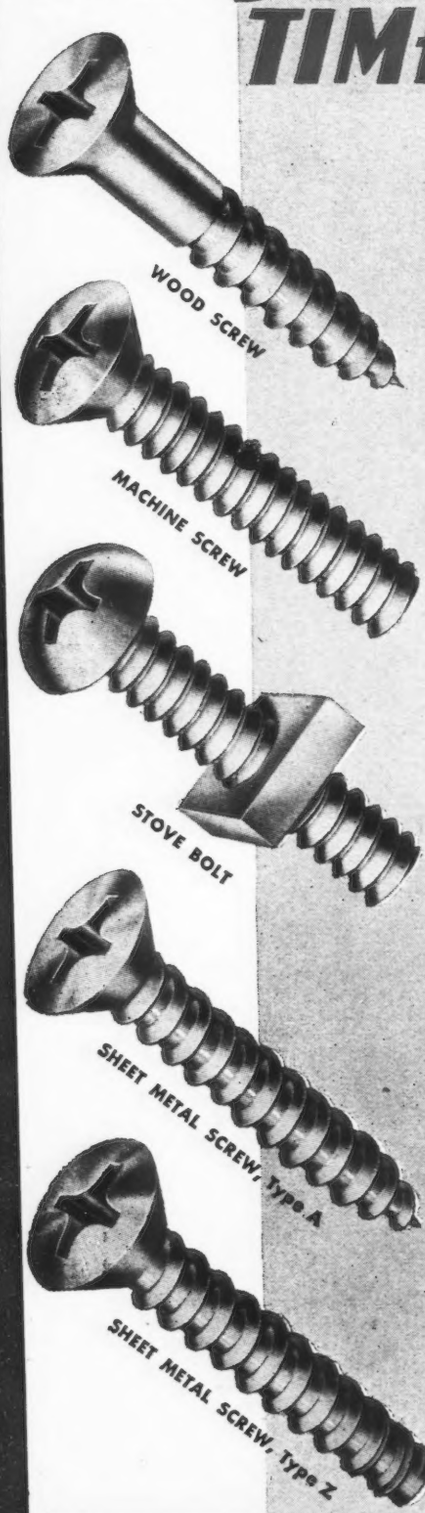
RECESSED HEAD SCREWS and BOLTS

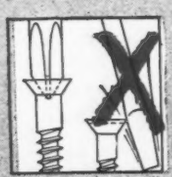
SAVE 50% FASTENING TIME and COSTS



Start at the heart of your assembling to cut costs and boost production. Replace old screw driving methods with HOLTITE-Phillips Screws, Bolts and allied fastenings. Replace slow, hazardous hand driving with safe spiral or power driving, even on finished parts. Women and green hands can power drive HOLTITE-Phillips fastenings with speed and safety.

For fastening *any material* at low cost, specify your needs from the complete HOLTITE line.

One hand driving. Other hand free to hold or steady work. Time saver.



Driver or bit cannot slip to mar finished work or injure workman.

Faster methods of driving with safety. Driver cannot jump from recess.

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weapons by studying tons of captured enemy material and documents, as well as the newest developments of private industry and other military services. With this information, plus their own discoveries, the Air Ordnance intends to keep the Army Air Forces ahead of any potential enemy by providing the most modern and best equipment devised.

OPA Warns Resellers To Figure Steel Prices At Buyer's Destination

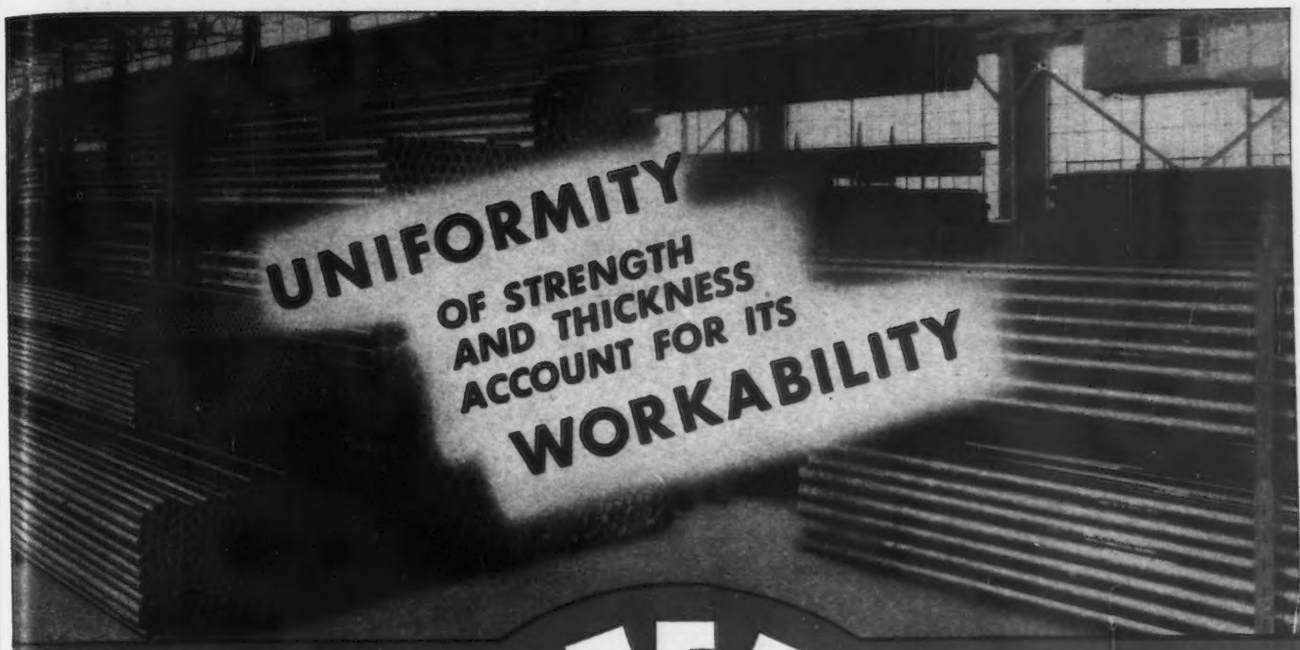
Washington

• • • **Resellers' maximum** delivered prices for iron or steel products must be figured on the basis of the buyer's destination, the Office of Price Administration urgently reminded the trade. This precautionary statement was directed expressly at buyers and sellers operating under Revised Price Schedule No. 49—Resale of Iron or Steel Products. The Schedule defines "destination" as "the place at which delivery is required for the buyer's operations."

Evasion or violation of the provisions of RPS 49 requiring calculation of prices at "destination" is subject to prosecution, OPA said. Reports have reached OPA that some sellers are figuring ceiling prices on the basis of a "destination" other than the place where the buyer's operation is to be performed. These cases are now under investigation.

In order to clarify these requirements and clear up any confusion that may exist, the following explanation is offered for the benefit of those who may be violating the Schedule unintentionally.

Under RPS 49, the buyer and the seller both have responsibilities with respect to the establishment of the facts required for figuring the maximum delivered price. It is the responsibility of the buyer to disclose to the seller the true destination of the shipment. The seller, for his part, should satisfy himself as to the authenticity of the claimed destination, since this is an important factor in the calculation of the ceiling price. The seller may require the buyer to endorse the purchase order certifying the authenticity of the claimed destina-



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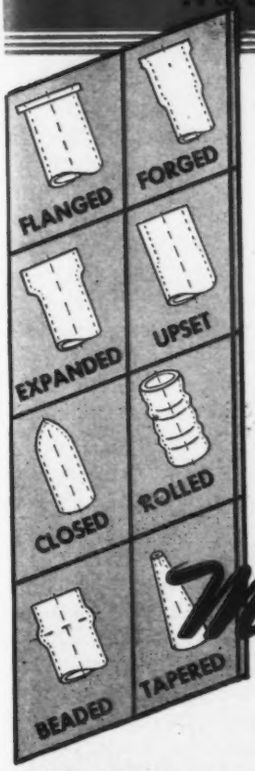
Maximum dimension 2½"
14 to 20 gauge.

¼" to 4" O.D.
9 to 22 gauge



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Because it re-forms and machines so well, Michigan welded steel tubing is widely used in the fabrication of production parts such as automobile exhaust and muffler tail pipes, gas tank filler tubes, steering jackets, and wherever bent and shaped tubes may be required. True concentricity, uniform I. D. and O. D. make it particularly economical when long runs are involved.

Prefabricated Parts or Tubing

Michigan will furnish the complete part fabricated from welded steel tubing, all re-formed and machined. If you have the equipment and capacity in your own plant to do this work, consider Michigan as your source for tubing in the sizes listed above—commercial mill lengths or cut to special lengths.

Engineering advice and technical help in the selection of tubing best suited to your needs.

Michigan STEEL TUBE PRODUCTS CO.

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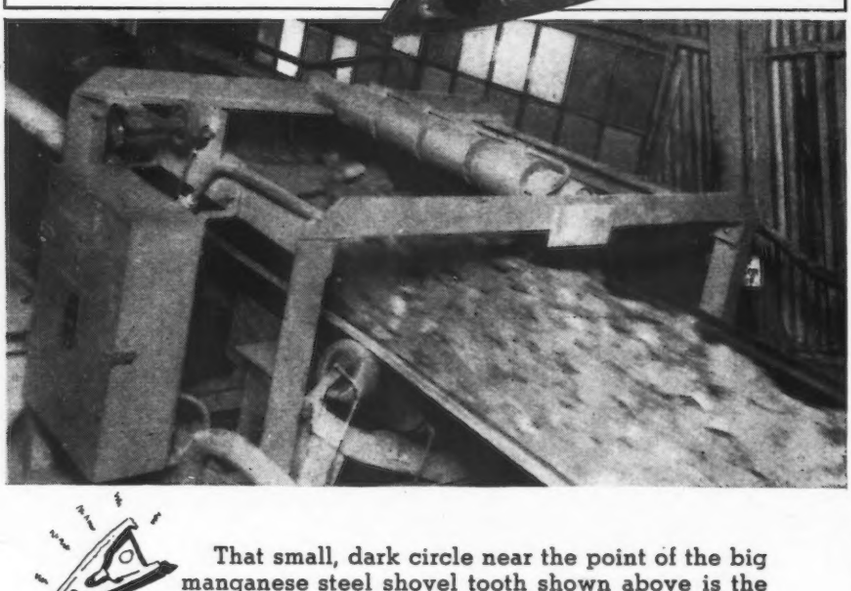
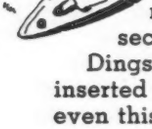
How to catch MANGANESE STEEL with a Magnet





That small, dark circle near the point of the big manganese steel shovel tooth shown above is the secret of catching non-magnetic manganese steel with Dings Magnetic Detectors. It is a piece of magnetic steel, inserted in the tooth. Dings Detectors are so sensitive that even this small magnet sounded an alarm and stopped the conveyor belt before the tooth could reach and wreck the crusher. This simple method of detecting manganese steel is adaptable and practical for almost any part which may find its way into machinery vulnerable to tramp iron damage. Dings Detectors will signal the presence of magnetic objects as small as 0.2 cubic inch size...or may be adjusted to pass tramp iron up to the safety limits of equipment being protected. *Full details on specific magnetic separation and protection problems will be promptly supplied on request.*

DINGS MAGNETIC SEPARATOR CO.
516-517 East Smith Street
Milwaukee 7, Wis.

"Separation Headquarters Since 1899"

Dings
"HIGH INTENSITY"

tion. This endorsement has the effect of limiting the seller's responsibility with respect to the destination, provided he acts in the belief that the endorsement was made in good faith.

Concealing the destination or stating a false destination, with the result that a price higher than the true ceiling is figured, is a violation of the Schedule. It is equally a violation of the Schedule for a seller to request or to otherwise influence the buyer to specify a destination other than the true destination when such change results in the calculation of a price higher than the true ceiling price.

Only in certain specified instances, OPA pointed out, is it permissible for the destination to be established at a place other than where the buyer's operation is to be performed. These are as follows:

(1) When delivery is for consolidation with other material owned by the buyer and for subsequent shipment to some other point, but only when the total delivered cost of iron or steel products purchased does not exceed the maximum delivered price at the true destination.

(2) When the true destination of the shipment is a military secret.

(3) When delivery is made at the public carrier's terminal nearest to the true destination if it were customary for the buyer to accept delivery of materials at such point when making purchases of iron or steel products from warehouses on or prior to Apr. 16, 1941.

Regarding the practice of selling f.o.b. warehouse, OPA also stated, a seller may do so provided the total cost to the buyer at his destination does not exceed the destination price otherwise established by the Schedule.

Export Tips Published

Washington

• • • **The Dept. of Commerce** has made available copies of a 46-page report entitled "Foreign Trade (Basic Information) Sources." The report gives the title, price and source of issue of many governmental and nongovernmental publications covering various phases of foreign trade. Copies of the report may be obtained free from the Department.

WAA Sets Up Group To Furnish Expert Analysis and Advice

Washington

• • • **Five advisory review boards** covering general, disposal, aircraft, real property and acquisitions have been set up by War Assets Administrator Robert M. Littlejohn to provide expert analysis and recommendations in all major actions and problems to guide himself and other top officials of the disposal agency in making final decisions. The General Review Board will serve the Administrator directly. Each of the other boards will serve a deputy administrator.

WAA officials will be responsible for making the final decision, but the boards of review will provide them with thorough analysis based upon the broad collective experience of the board members. The system, it was pointed out, is designed to insure that administrative decisions are in the best interest of the Government and are in accordance with the intent of the Surplus Property Act of 1944. Complete records of all meetings will be maintained, including a record of arguments both for and against a recommendation. The boards will provide a review for all officials both before and after they have acted on matters involving contracts, controversies and sales.

Simultaneously with the issuance of the directive, Mr. Littlejohn announced that he had made the following appointments to the General Review Board, which will serve him directly:

Chairman: John M. Hager, Los Angeles, an economist with wide experience in government and industry, formerly executive assistant to the Commissioner of the Federal Home Loan Bank Admin., assistant to the president of Crucible Steel Co. of America, and economic advisor to the United States Legation in Copenhagen.

Secretary: Donald N. Uthus, Milwaukee, industrial consultant and formerly assistant to the operations vice-chairman of the WPB.

Frank Upman, Jr., Hartford, an engineer, formerly Highway Commissioner of Connecticut, a member of the Connecticut War Industries Commission, chief liaison officer for the President's Committee for Congested War Production

IN SPEEDING UP the fitting of machine parts by eliminating the precision machining otherwise required, Laminum shims actually add to the certainty of uniform accuracy . . . you simply peel laminations of known precision gauge from the solid shim. Bulletin on request.

Laminum shims are cut to your specifications. For maintenance work, however, shim materials are sold through industrial distributors.

Laminated Shim Company, Incorporated
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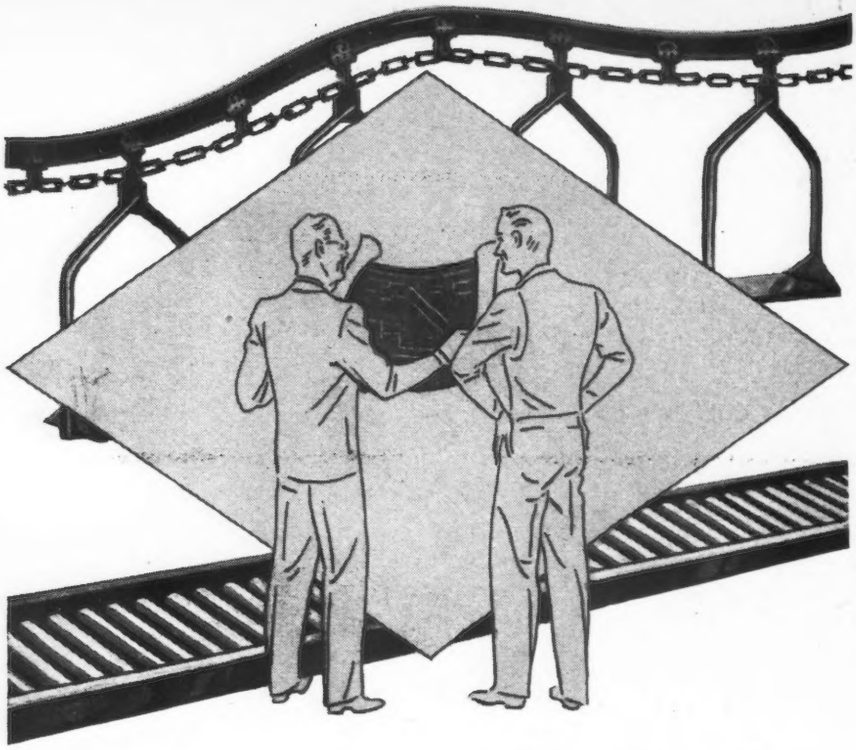
LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

207



Alvey-Ferguson ENGINEERING is the basis of an EFFICIENT Conveyor System

CORRECT HANDLING of your materials and products requires much more than merely the installation of sections of conveyor . . . The engineering skill and experience Alvey-Ferguson has acquired during 45 years of installing every type of conveyor system in practically every type of plant gives A-F Engineers a great advantage in designing and installing a plant-wide system for greatest efficiency and economy.

The character of your raw materials and finished products . . . the surface finish . . . the sizes . . . weights . . . conditions under which the system must operate—all these are basic considerations which must be carefully considered.

After such a study, the best type of conveyor system needed for your operation is engineered — gravity, power, roller, apron, belt, chain, pallet, overhead trolley — or perhaps a combination of several of these types to co-ordinate all departments, reduce handling expense and set new records in efficient production.

Why not write for a discussion regarding your future materials and products handling—today?

45 YEARS OF SERVICE TO INDUSTRY

1901–1946 THE ALVEY-FERGUSON COMPANY CINCINNATI, OHIO A-F

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CONVEYING EQUIPMENT
A-F CONVEYING MACHINERY
Alvey-Ferguson
METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

Areas, and Director of Transportation for the Allied Commission in Italy.

Malcolm J. Miller, Columbia, S. C., formerly assistant to the director of the production and marketing Admin., of the U. S. Dept. of Agriculture.

Perry A. Fellows, Detroit, who has held the position of Chief Engineer for the Office of International Trade of the Dept. of Commerce.

Mathew J. Gunner, Dallas, an Army officer with 34 years of service who commanded a regiment on the first expedition to Iceland.

Edwin T. Bowden, Martin, Tenn., for 30 years an Army officer with 18 years of infantry duty in various command and staff jobs, is a graduate of University of the South.

Bulletin Sets Forth German Technical Gains

Washington

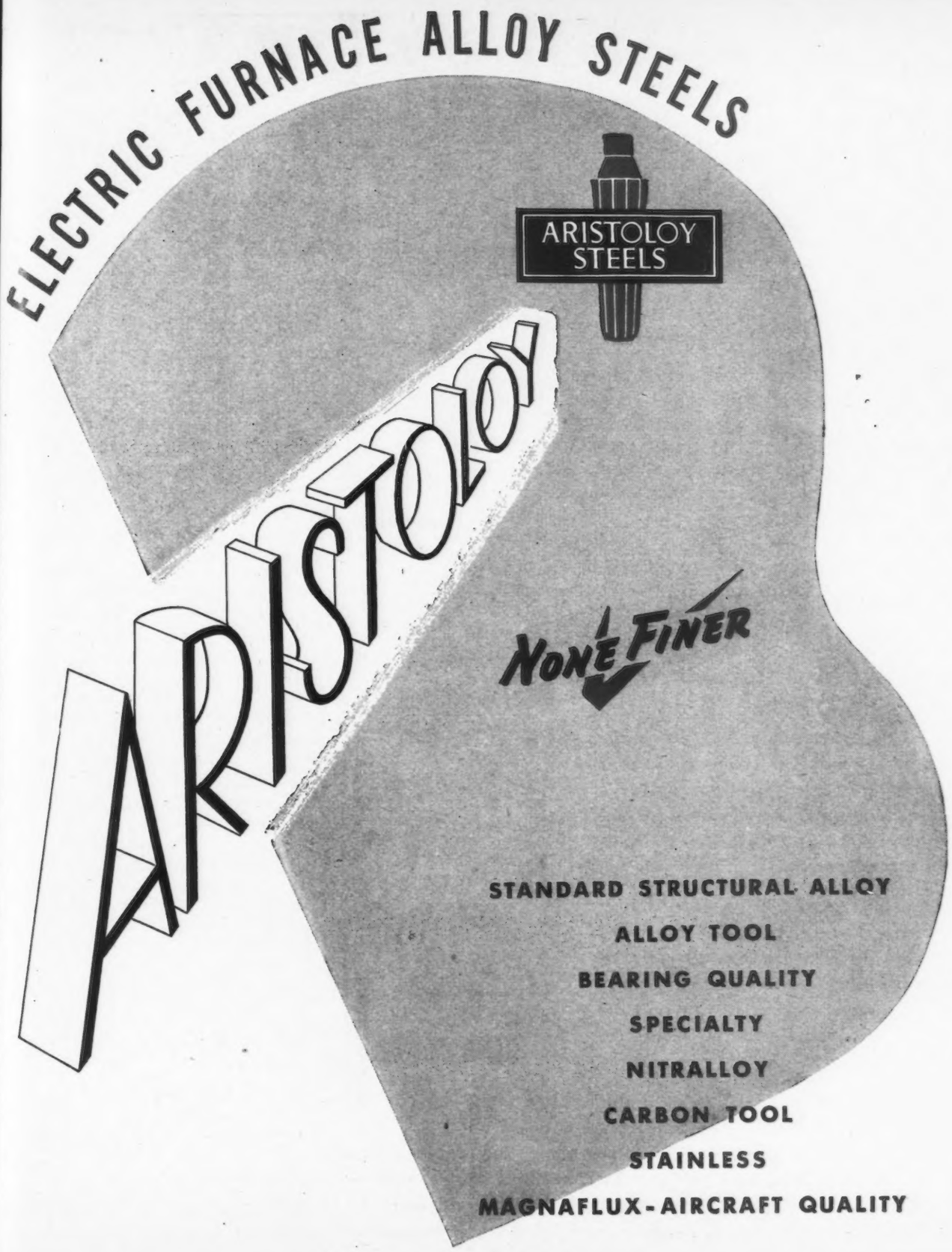
• • • **Recent German** technological advances in the extraction and utilization of lithium and its compounds are described in a publication just released by the Bureau of Mines. It is based on a survey of the German lithium industry in the summer of 1945.

It reveals that for several years a German manufacturing combine utilized lithium metal in the production of railroad bearings and in copper alloys. German metallurgists also conducted studies in the preparation of lithium, cadmium and lithium-aluminum alloys and attempted to utilize lithium metal as a degasifying agent in radio tubes.

Numerous descriptions of current German techniques for producing the various lithium salts are also presented in the publication.

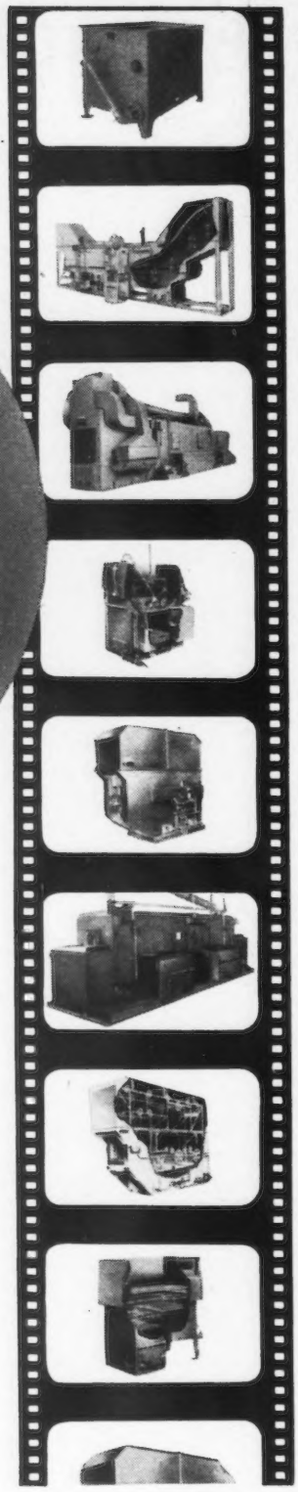
Although the major source of Germany's lithium is zinnwaldite, a mineral belonging to the mica group, certain quantities of imported lepidolite and amblygonite are also used.

Copies of Information Circ. 7361, "Extraction and Uses of Lithium in Germany," may be obtained by writing to the Bureau of Mines, Dept. of the Interior, Washington 25, D. C.



COPPERWELD STEEL COMPANY • WARREN, OHIO

STANDARD PRODUCTS PAY OFF



In Metal Cleaning

Because metal-cleaning problems differ in so many ways, a complete line of cleaning processes and products is necessary. Here is a typical specialized problem solved by TRIAD 90—a standard Detrex emulsion.

Cleaning ferrous wire is a tricky operation. For a trouble-free job, obstinate drawing compounds must be removed, rusting after cleaning must be prevented and wire lubrication must be provided. TRIAD 90 scores on all three counts.

Specialists in all phases of metal cleaning, Detrex field representatives analyze every factor before recommending the process and product for the job. And you can be sure that that product—whether a vapor degreasing solvent, an alkali, or an emulsion—is RIGHT. Do as thousands of others are doing when production is bottlenecked in the cleaning department—*call a Detrex field representative today.*

DETREX Corporation
DETROIT 32 MICHIGAN
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American Gas Assn. Announces Program For October Meeting

New York

• • • **The twenty-eighth** annual convention of the American Gas Assn. the first full-fledged post-war meeting—will take place in Atlantic City, N. J., from Oct. 7 to 11. Simultaneously, an exhibition of gas appliances and equipment, sponsored by the Gas Appliance Manufacturers Assn., will be held.

It is reported that advance registration indicates an attendance in the neighborhood of 10,000—an all-time high. Demand for space in the exhibition has already exceeded any other such event in the history of the gas industry.

The convention will get under way Monday morning with meetings of the Association's two departments. Under Chairman R. H. Hargrove, United Gas Pipe Line Co., the natural gas department will spotlight discussions of natural gas reserves, pipe line flow research, volume sales and recent developments in natural gas regulation.

The manufactured gas department, led by Hudson W. Reed, president of The Philadelphia Gas Works Co., has arranged for authoritative presentations on topics of major importance to manufactured and mixed gas companies. Speakers will include E. V. Murphree, vice-president, Standard Oil Development Co., New York, on "Research—An Industrial 'Must'," and William W. Bodine, financial vice-president, Penn Mutual Life Insurance Co., Philadelphia, on "The Financial Outlook of the Manufactured Gas Industry."

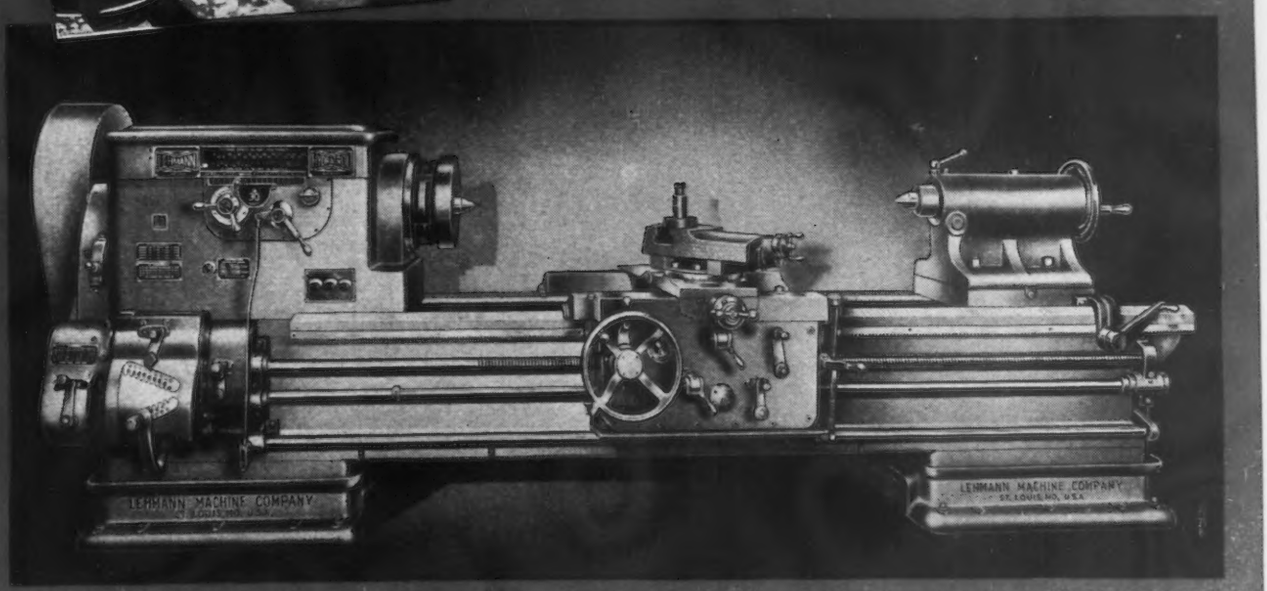
An important feature of the manufactured gas department meeting will be a symposium on the outlook for raw materials for manufactured and mixed gas companies from the standpoint of their availability and future costs. Ranking executives of companies leading in the supply of coal, oil, liquefied petroleum products and natural gas will review the outlook for each of these materials.

Putting a finger on one of the nation's foremost industrial problems, an employee relations forum will be held Monday afternoon under the leadership of Fred R.

HYDRATROL LATHES

Keep Right On Cutting

...CUTTING COSTS
...CUTTING TIME
...CUTTING REJECTS!



WHEN HYDRATROL LATHES enter the machine tool picture, the story is invariably one of Lower Costs, Increased Production, and Improved Work.

Shop after shop is finding that it can do many machining jobs *better* with a Heavy Duty HYDRATROL LATHE. The 30" size, shown above, has all the ruggedness and power for the heaviest possible work. And its many refinements in design and construction result in an ease of operation comparable to small machines.

Why not let us show you what a Heavy Duty HYDRATROL LATHE could do in *your* shop? Send us prints for a time-and-money saving recommendation.

Standard Type, Heavy Duty Lathes, 20" to 36"
Large Hollow Spindle Type Lathes, 18" to 36"

MOVIE SOUND FILM, in natural color, available, showing functions of Hydratrol Lathe, advanced construction features, and production machines in operation. Ask the Lehmann representative for a showing.

LEHMANN MACHINE COMPANY, ST. LOUIS 3, MISSOURI

HYDRATROL LATHES

(HEAVY DUTY TYPE)

This Man Will Help You CUT POLISHING COSTS

He is a General Abrasive polishing engineer. With his wide experience in all phases of polishing and grinding, he is at your disposal to study your polishing operation and make recommendations for improvement. Many manufacturers have found that they can improve production and quality and at the same time reduce polishing costs by following the recommendations of the LIONITE representative.

If you feel that changes in your wheel set-up or in any other phase of your polishing procedure might be improved, ask to have the LIONITE representative call. There is no obligation.

GENERAL ABRASIVE COMPANY, INC.

Lionite and Carbonite Abrasive Grains

NIAGARA FALLS, NEW YORK, U. S. A.

Rauch, chairman of the association's personnel committee, and vice-president, The Cincinnati Gas & Electric Co. Introduced by Everett J. Boothby, president of the American Gas Assn., this timely program includes such topics as: "Management's Stake in Collective Bargaining," by Dr. George W. Taylor, Professor of Industry, The Wharton School of Finance and Commerce, University of Pennsylvania; "A Program for Labor Peace," by C. B. Boulet, director of personnel, Wisconsin Public Service Corp., Milwaukee; "Better Relations Through Better Information," by W. H. Senyard, personnel director, Louisiana Power & Light Co., Shreveport. Discussion leaders will include M. V. Cousins, personnel director, United Gas Pipe Line Co., Shreveport; and F. W. Fisher, director of personnel and public relations, Rochester Gas & Electric Corp.

The convention program committee, headed by Irving K. Peck, Manufacturers Light and Heat Co., Pittsburgh, has been tireless in putting together an interesting general sessions' program. With president Boothby in the Chair, the first general session opens Tuesday morning with a report on the Association's Finances by Edward F. Barrett, AGA treasurer, and president, Long Island Lighting Co., which will be followed by the election of officers for the 1946-1947 term.

J. A. Krug, Secretary of the Interior, addressing the Tuesday session, will lead off an imposing array of speakers from outside the industry. Widely known and respected in the gas industry, Mr. Krug's background as wartime director of the Office of War Utilities and as chairman of the War Production Board, not to mention his former affiliation with the Tennessee Valley Authority, make him admirably equipped to discuss his topic, "The Government and Business."

The gas industry's stepped up program of research and promotion will be placed before the industry in the annual report of the association's managing director, H. Carl Wolf. Speaking on "An Industry With a Program," Mr. Wolf will delineate the cardinal

points in the industry's platform of progress.

The third general session, Thursday morning, will open with an analysis of the "Economics of Tomorrow's Business," by Prof. Erwin H. Schell, head of the Business and Engineering Administration, Massachusetts Institute of Technology, Boston. Professor Schell is no newcomer on gas industry programs and has always had a valuable message for his audience.

Focussing attention on the gas industry's greatest market, the American home, Robert F. Gerholz of Gerholz-Healey Co., Flint, Michigan, will present an informative summary of the latest trends in residential housing. In addition to heading a prominent Flint concern, Mr. Gerholz is a past president of the National Assn. of Home Builders and has his finger on the pulse of the construction industry.

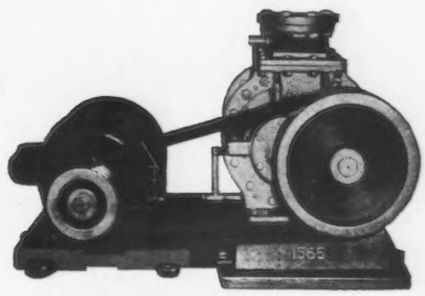
Elmo Roper of New York, as the next speaker, will tell the gas industry "What the Public Thinks of Business." Backed by his experience as producer of the Fortune surveys, New York *Herald Tribune* analyses, and other widely-read and often-quoted opinion samples, Mr. Roper's address is expected to be an interesting one.

Returning to a subject which will have received concentrated attention at the employee relations forum, Warren Whitney, manager, National Cast Iron Pipe Div., James B. Clow & Sons, Birmingham, will talk on "Human Relations—Today's Management Challenge." Under his guidance Mr. Whitney's company has established an enviable record in safety and personnel matters and he will bridge the gap between the two sessions by emphasizing the importance and interrelation of these topics.

Friday of convention week is being reserved for committee and other miscellaneous meetings, and for a final look at the gas appliance exhibition. Ample time has been allowed between sessions for a thorough inspection of the manufacturers' exhibits and no events are scheduled for Wednesday afternoon, thus allowing further time for this activity.

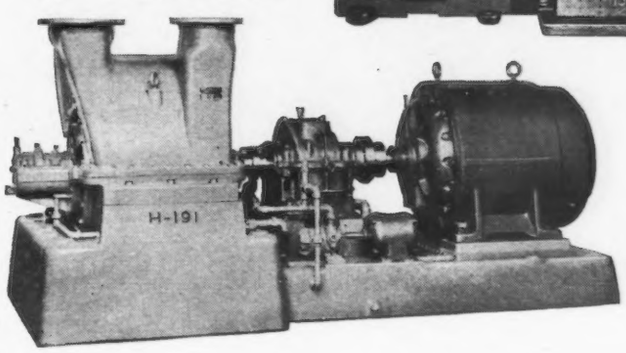
R-C *dual-ability*

PLAYS NO FAVORITES



(Right) Typical small R-C Rotary Positive Vacuum Pump, used in textile processing plant. V-belt driven from constant speed motor.

(Below) Multi-stage R-C Centrifugal unit, suitable for either vacuum or pressure service. Driven by constant speed motor through reducing gear.



Our recommendations for vacuum pumps are completely unbiased as to types. We build both Centrifugal and Rotary Positive units and will supply whichever one best suits your needs. That's R-C *dual-ability*.

During our 92 years of building equipment to handle air, gas and liquids, we've gained wide experience which can be valuable in solving your problems. Users frequently find that our *dual-ability* permits substantial cost savings, space and weight reduction, and other important advantages that provide a more profitable investment.

Our Centrifugal units are best suited for handling larger capacities at moderate vacuums, while the Rotary Positive type can provide vacuums up to 26-inch Hg. There is a wide range of standard sizes, or special units can be furnished.

ROTARY POSITIVE

Whether your needs call for Centrifugal or Rotary Positive equipment, you can be sure that Roots-Connersville will design simply, and build sturdily, to give you long, trouble-free, profitable performance.

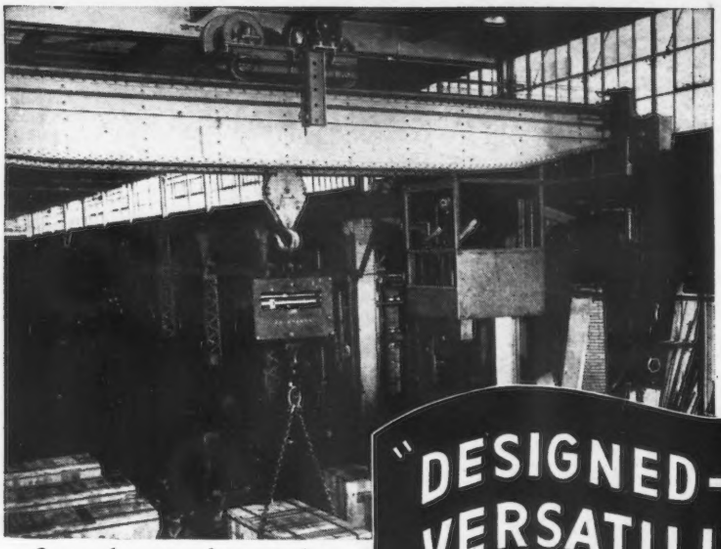
CENTRIFUGAL

ROOTS-CONNERSVILLE BLOWER CORP.
One of the Dresser Industries
609 Ohio Avenue, Connersville, Indiana

Roots CONNERSVILLE SINCE 1854

VACUUM PUMPS

ROTARY POSITIVE AND CENTRIFUGAL BLOWERS • EXHAUSTERS • BOOSTERS
LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS



"DESIGNED-IN" VERSATILITY

Smoothness of operation and precision of control are *plus* features designed into the better cranes.

More than merely *lifting* and *moving* machines, they speed production through handling fragile molds in foundries, placing valuable parts during assembly, mounting scales such as here illustrated, etc.

EUCLID CRANES AND HOISTS
Raise Profits

For consistent long run performance with minimum operation and maintenance cost, you can depend on Euclid Cranes.

THE EUCLID CRANE & HOIST CO.
1361 CHARDON ROAD • EUCLID, OHIO

HANNATEN IRON INGOT
10 POUNDS

GRADES:
BASIC
SILVERY
FOUNDRY
MALLEABLE
FERRO-SILICON

BRANDS:
SUSQUEHANNA
BUFFALO
DETROIT

Smaller . . . easier to handle . . . finer grain structure . . . more adaptable to the varied requirements of foundry operation. That's the new HannaTen ingot, produced in all grades of Hanna iron. Take advantage of this important development to attain more uniform distribution in the melt, to assure more accurate control of composition. It's another great Hanna "first."

The Hanna Furnace Corporation
Merchant Pig Iron Division of National Steel Corporation
BUFFALO • DETROIT • NEW YORK • PHILADELPHIA • BOSTON

. . . THE BEST KNOWN NAME IN IRON

Set Prices for New Powders and Flake Of Stainless Steel

New York

• • • **A new low-carbon** stainless steel powder is now being produced in commercial quantities. This powder is the result of years of research and development work to meet the requirements of the fabricator of metal powder parts by Charles Hardy, Inc., New York, metal powder supplier.

Of interest to metal powder fabricators, the new stainless steel powder appears to be suited for the manufacture of porous filters, acid and corrosion resistant parts, watch cases, and a variety of applications where the characteristics of stainless steel are desired in combination with the advantages of powder metallurgy.

Of interest to the coatings industry, a stainless steel flake powder with excellent covering properties has also been developed. It is suitable for admixture with usual vehicles. Preliminary tests indicate good acid and corrosion resistance where ordinary protective coatings fail. The granular product is suitable for metal spraying.

The following data have been consistently reported on tests conducted in the laboratory, according to Charles Hardy, Inc. Tensile specimens were made of 18-8 stainless powder of the regular minus 100 mesh type. This powder was compacted at pressures of 30, 40 and 50 tons per sq in. The samples were sintered at 2400° F for one hour at temperature in dry hydrogen. The following average results were obtained:

Pressure tons per sq. in.	Tensile Strength lb per sq. in.	Elongation per cent
30	26,400	12
40	31,600	14
50	54,200	22

Because of the slight change in size found in sintering and because conventional practice in the manufacture of molded articles calls for as low pressures as possible, tensile bars pressed at 30 and 40 tons per sq in. were coined or repressed at 40 tons per sq in. and annealed at 2400°F for one hour in dry hydrogen. The aver-

age physical properties after coining were:

Pressure	Coining	Tensile Strenth	Elongation
30	40	49,500	19
40	40	55,700	26

The change in size after annealing which followed the repressing operation was very slight. Thus, high physical properties combined with low working pressures and excellent size control may be achieved using minus 100 mesh stainless steel powder.

Prices for samples and for commercial quantities all grades f.o.b. New York, are announced according to the following list:

5 to 24 lb.	$1.25
25 to 99 lb	1.15
100 to 499 lb	1.05
500 to 1999 lb	.90
2000 lb up	.75

West Coast Group Talks On Heating Techniques

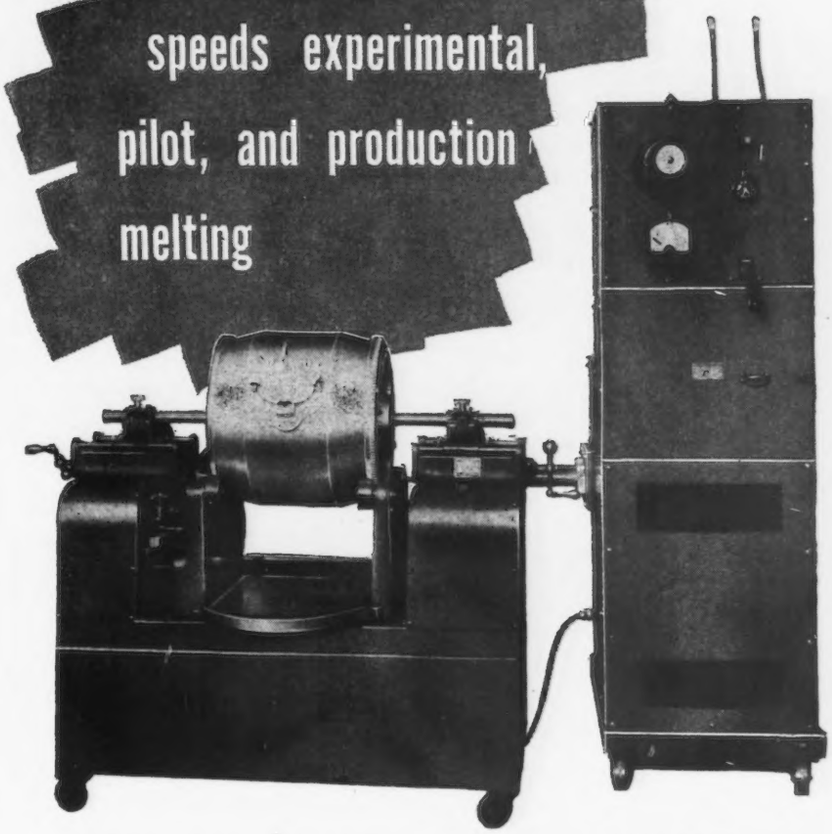
San Francisco

• • • A 2-day conference on the subject of high frequency heating conducted cooperatively by a number of technical societies and the Pacific Gas and Electric Co. here recently drew a large attendance and afforded an opportunity for the demonstration of new techniques in this field as applied to the metalworking industry. Included were papers on the melting of metals by induction heating, application of high frequency heating in the forging of metals, baking of foundry cores, heat treating with induction heating and the application of high frequency heating to brazing and soldering.

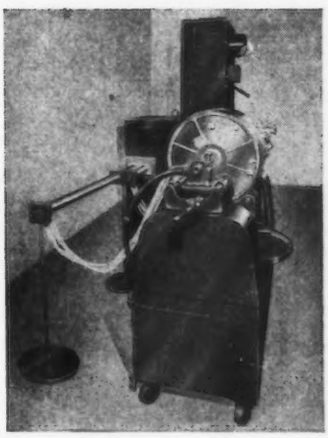
J. H. Gumz, P. G. & E., presided, with the following organizations cooperating: American Welding Society, ASME, ASM, ASTE AIEE, Electrical Maintenance Engineers Assn. of Northern California, Electronic Section of San Francisco Chamber of Commerce, Institute of Food Technologists, Institute of Radio Engineers, Northern California Electrical Bureau, Pacific Coast Electrical Assn., SAE, American Foundrymen's Assn., American Institute of Mining and Metallurgical Engineers, West Coast Electronic Mfrs. Assn.

VERSATILE DETROIT ELECTRIC FURNACE

speeds experimental, pilot, and production melting



The Detroit Rocking Electric Furnace, type GMS or GMSR 30 Kw., is a practical investment in profitable foundry operation, because it is small enough for pilot and experimental work, yet fast enough for production melting. Designed with a crock and cover lining which is available in alundum, magnesite, sillimanite, zircon, or carbon, either model is adapted for testing a large variety of alloys. Spare interchangeable shells may be used if different refractory linings are necessary. In production work, the relatively small cold charge capacity of 60 lbs. and molten iron capacity of 100 lbs. are more than compensated for by the speed and positive control which enables these furnaces to melt 600 lbs. of iron or 800 lbs. of brass in one 8-hour day. Send us facts about your melting requirements. Our engineers will show you how the type GMS, GMSR, or other type Detroit Rocking Electric Furnaces can increase quality production in your foundry at low cost.



Side and front views of Type GMS Detroit Electric Furnace showing simplicity of power connections, improved manual electrode control, transformer primary knife switch, and meter panel.

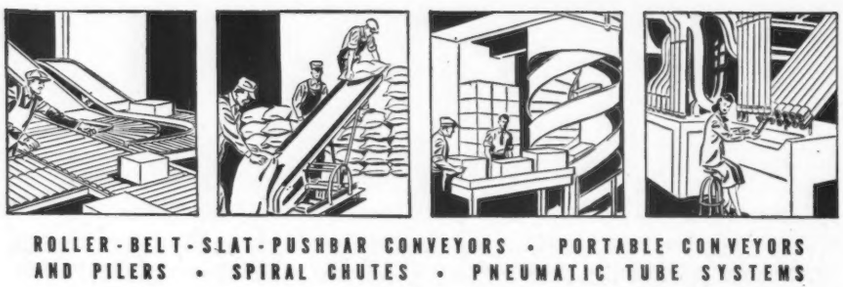
DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

THE range and versatility of Standard Conveyor equipment is the result of nearly 40 years of close contact with conveying problems — large and small installations.

If you need just a light, portable section of conveyor to speed handling in warehouse or on shipping platform — complete, continuous flow system linking manufacturing or packaging operations — or a portable unit to speed handling in storage and shipping areas — Standard Conveyor Company can supply you with any one or all three.

Write for "Conveyors by Standard" Bulletin No. IA-96—a valuable conveyor reference book that will be useful to you.

STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities



ROLLER · BELT · SLAT · PUSHBAR CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS

Discusses Possibilities Of Southern Rhodesia As a Steel Producer

By W. B. DAWSON
Former Chief Superintendent of Transportation, Rhodesia Railways

Southern Rhodesia

• • • **Great Britain,** like other European countries which export finished steel products, is unable to produce sufficient raw materials to keep its capacity fully occupied, and has imported millions of tons of pig iron, ingots, billets and iron ore.

With its large deposits of iron, coal and limestone, as well as large rivers capable of supplying the necessary water, and extraordinarily cheap common labor, the question is raised whether or not Southern Rhodesia is a possible producer of pig iron, steel billets or manufactured steel to assist in meeting the world's demands. The subject is worth investigating by those interested in iron and steel production, and particularly so just now with nationalization of steel in Great Britain in the air.

Southern Rhodesia is a British selfgoverning colony in the southern part of Africa which has no port of its own. On its eastern boundary the nearest port is the Portuguese port of Beira, nearly 200 miles away. On the southern side the port most favored is Port Elizabeth, in the Union of South Africa, a matter of 1100 miles. There is no accessible port on the western boundary, and on the northern side the Portuguese port of Lobito Bay is too far away to be of any use to Southern Rhodesia.

Nevertheless, despite this disability of being without a port of its own, Southern Rhodesia has some claim to be worth investigating as a possible producer, on an export basis, of either pig iron or steel billets, or even the finished product. Southern Rhodesia is exceptional in that in its eastern district, within 200 miles of the port of Beira, 100 miles away from the existing railway, there are large deposits of iron, coal and limestone, as well as water, all within a radius of 20 to 30 miles.

On the assumption that the qualities and quantities are available for a large undertaking, sufficient

to justify a railway connecting the deposits with the port, there should be no difficulty, as has been shown, in finding markets. The geological map of the same area discloses the presence of gold, copper, chrome, tungsten, the investigation of which has probably been discouraged by distance from transport routes. Tungsten actually is being worked.

In the same district there are extensive areas of heavy indigenous timber forests which are untouched. A sugar plantation under irrigation is in the making some 40-50 miles away. In brief, the district has all the elements to become a thriving area if enterprise would take a hand.

The writer approaches the subject largely from the point of view of a railwayman. Given volume, rail transport charges can be brought down to such a low figure that they become almost negligible, so that if the essentials are available transport is not a serious matter.

Having that in view the writer considered the possibility of exporting only the iron ore, and he found that given 1,500,000 tons per year, a railway of 200 miles could be built to the coast and carry the ore at round about 50¢ per net ton, earn interest at the rate of 5 pct and at the same time set aside 5 pct amortization.

Big ships of 10,000 tons or more capacity for transporting the ore to Europe would be as necessary as they are on the Lakes in America, but the writer came to the conclusion when visiting England in 1938 that big ships would be a handicap, since few concerns, receiving ore direct from ships, are able to handle them.

He therefore dropped, for the time being, the idea of exporting iron ore, and switched to pig iron, because in this particular area coal, limestone and iron, as well as water are closely associated, and it was found that with a tonnage of 750,000 tons of pig iron a year a 200-mile railway could be built, and out of a railage charge of $2.00 a ton a profit could be made after paying 5 pct interest and setting aside 5 pct amortization. If the tonnage was reduced to 500,000 tons then the railage charge would require to be increased to $2.60 a ton, and of course the production

Improved Protection Against Overtravel with new Weight-Operated Limit Stop

No. 10-W Youngstown size; 40 H.P.; 230 volts; d.c. maximum rating.

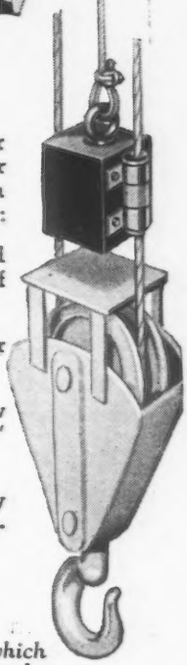
Now, a *weight-operated* Safety Limit Stop for the smaller horsepower crane-hoists. Tripped by *weighted* operating-lever when the danger zone is reached . . . reset *automatically* by suspended *weight* when controller is reversed to lower the hook-block. Other advantages are:

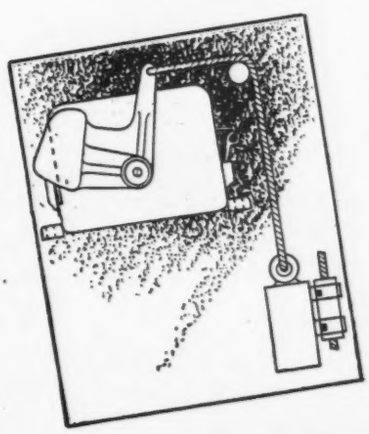
1 No lubrication required—Oilite bearings are self-lubricating and long-lived. This means that the costly and sometimes forgotten item of lubrication-maintenance is eliminated forever.

2 Compact—easy to mount—Small, over-all dimensions—four convenient mounting holes—one suspended weight.

3 Small reset travel—High crane lifts are possible with this new No. 10-W because the amount of travel between "run" and "tripped" positions has been kept at a minimum.

4 High interrupting capacity—Two normally open and two normally closed contacts, mechanically interlocked and with wide, vertical opening, always assure positive interruption of the hoist motor current.





Send for Bulletin 1032 which gives complete details for applying Youngstown Safety Limit Stops to both new and old cranes, either a.c. or d.c.

Optional Style—with offset weighted-arm which eliminates intermediate sheaves when Stop is not mounted directly over crane hook-block. Available on all sizes of EC&M Youngstown Limit Stops.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

An IMPROVED Burnishing Compound

A research man at Wyandotte Chemicals Corporation uses the Comparoscope to evaluate and compare the finishes on metal surfaces. By means of this carefully designed optical instrument, Wyandotte was able to make the burnishing-compound improvements that resulted in Wyandotte Burnishing Compound 315.

THIS new development in burnishing compounds is free of annoying and hazardous cyanide. Yet it surpasses the old-fashioned cyanide treatment in removing tarnish from copper base alloys, brass, bronze and copper. It gives the finest and brightest of finishes.

Wyandotte Burnishing Compound 315 rinses freely from the work and burnishing balls. It leaves no objectionable soap films to dull the work—no hard-water scum to call for frequent cleaning.

Your Wyandotte Representative will be glad to show you what lustrous surfaces you get by using Wyandotte Burnishing Compound 315. Why not give him a call today?

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION • J. B. Ford Division
WYANDOTTE, MICHIGAN • SERVICE REPRESENTATIVES IN 88 CITIES

could be so low as to make a railway uneconomical.

With this background the writer, for the purpose of making out a case for government investigation, sought the assistance of a fully qualified metallurgist. The latter was asked to estimate what the capital cost would be, and what the working costs would be, to produce 750,000 tons of pig iron a year, on the following assumptions:

(1) Coal, iron ore and limestone to be suitable, and to be produced at point of use at 50¢ per short ton. (There are precedents for a figure such as this in South Africa. Native labor would predominate, and would be recruited in and around production site. At present this labor is attracted elsewhere, but it is considered this could be overcome.)

(2) Railage to port: $2.00 per short ton.

(3) Placing on board ship: 20¢ to 40¢ per short ton.

(4) Conference Lines of Steamers to treat the pig iron more or less as ballast—say $3.00 per long ton.

The conclusion arrived at was that the first cost or capital cost would be $28,000,000, **and that** working costs and depreciation plus transport, would enable delivery to be made in Great Britain at about $16 per long ton, the prewar price of pig iron, and allow a small profit. Today pig iron is sold in Great Britain round about $32 per ton, and with the recent trend of wages and coal—less work for more pay and so on—a return to anything like the prewar price seems to me improbable. At all events a safe margin for a Rhodesian effort is indicated.

The next step was to put this data before the Southern Rhodesia government, and ask for an investigation into qualities and quantities. In course of time a government mining engineer and a geologist were deputed to investigate and report. They spent some six weeks in the district, submitting an interesting but unfortunately incomplete report, since it was only a field survey. The conclusions of the government mining engineer briefly were:

Iron Ore: Several deposits, but

only two examined. One 60-68 pct metallic iron, and the second 33-40 pct. A depth of 50 ft was assumed, and an estimated tonnage of 14 millions for the former, and 39 millions for the latter. In the aggregate this is of course much too low for a scheme such as that contemplated. The government mining engineer stated, however, "It would seem that the supply of ore from the above bodies could be considerably augmented if other deposits were explored and opened up."

Coal: 16-ft seam, as well as small seams. Cokeable but high in ash content. Admitted by government mining engineer that "at no time has sufficient work been carried out to expose fully the coal measures." No information available about Btu's.

Limestone: Appeared to be suitable for fluxing purposes, and a sufficient reserve exists to meet all requirements.

Water: Sabi River, 9 to 12 miles away, permanent throughout the year. Considered it should be possible to formulate scheme for producing hydroelectric power.

This report was deemed by the department concerned to be insufficient inducement to proceed in the matter and no further action was taken. The metallurgist, too, finding the assumptions on which he worked out his estimates not supported, also withdrew his support. It should be added that in his estimates of production costs the metallurgist included $2,800,000 per year for depreciation, being 10 pct on capital cost—in other words no less than $3.70 per ton for depreciation was included in the contemplated delivered price of $16 per ton in Great Britain.

In the view of the writer this conclusion is unsound. The possibilities are too big to be abandoned on such insufficient grounds. As regards the iron, there is sufficient evidence to justify the belief that the reserves are adequate as to quantity. As to quality, there may be some need for blending high and low qualities, but there is nothing to support the fear that this extra cost might ruin the whole scheme.

As to coal, only the top few inches of the 16-ft seam were tested. Few seams of coal are of equal

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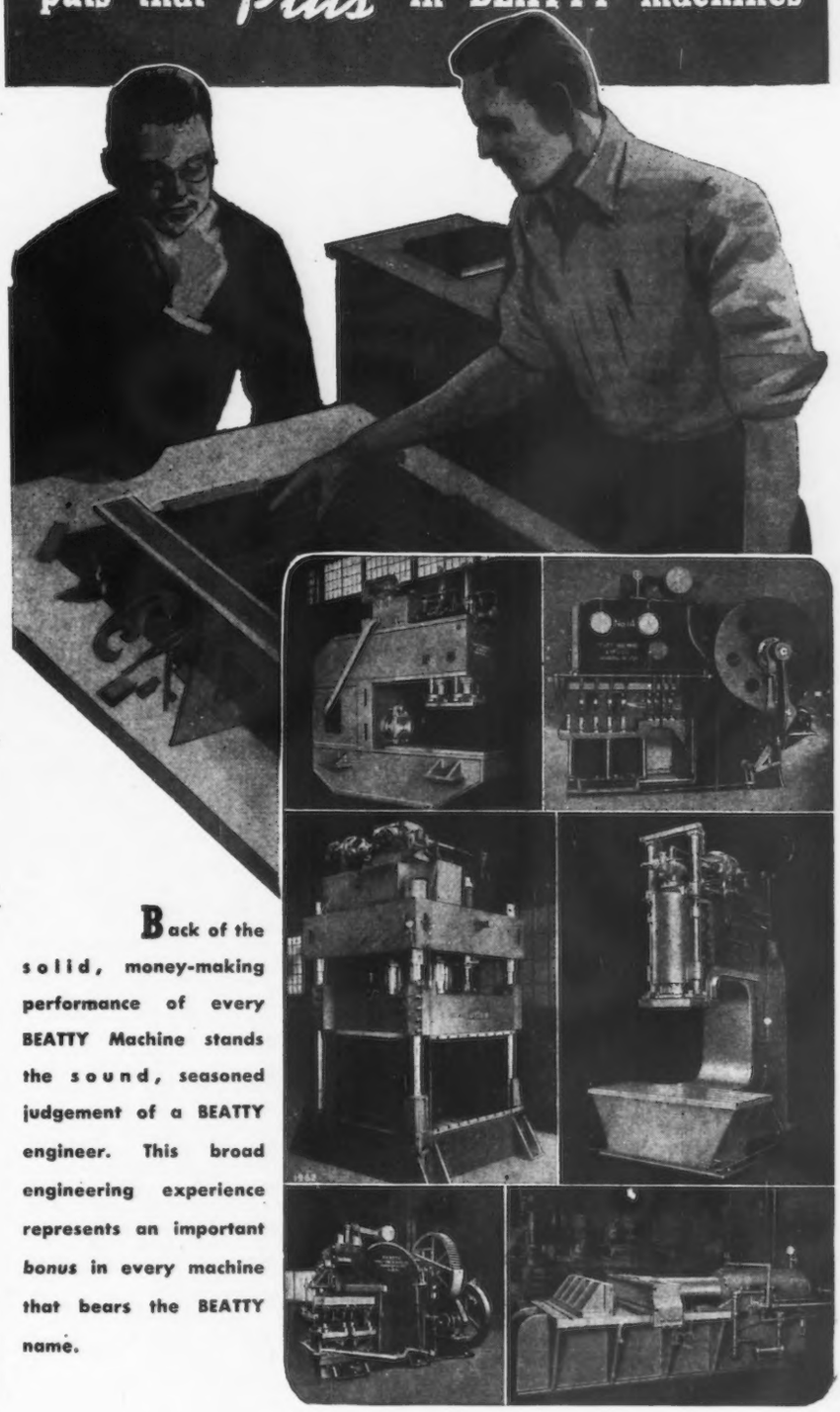

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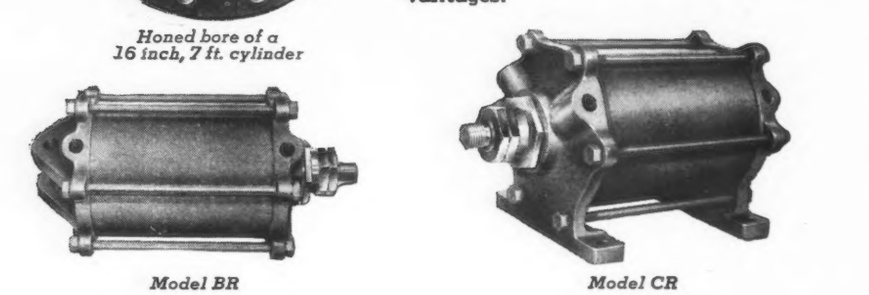

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quality throughout but even if after further investigation it should be proved that the coal is not sufficiently high in quality to produce the type of coke required for high quality pig iron, it remains to be investigated whether:

(1) Hydroelectric power, if available, combined with a low-quality coke—a method favored in Sweden and Norway and spreading elsewhere—might not enable a high quality pig iron to be produced economically, or, alternatively,

(2) Whether it would be practicable to use, as in the Union of South Africa, low-quality coal, delivered crushed to dross to power station bunkers at 50¢ per short ton, or probably less, to produce low-priced electric power for combining with poor coke.

Having by investigation established that all the essentials are there for the production of high quality iron or steel, and that the esimated cost of production would gain entry into any market, it then becomes necessary to deal with other aspects of the problem, as follows:

(1) Byproducts and their disposal.

(2) Access to the sea through Portuguese territory. An industry such as this would prove to be beneficial to the territory in many ways, and it is assumed that the attitude of the Portuguese authorities would be one of assistance.

(3) Contact would require to be made with the Beira Railways and with the Beira Harbour Authorities, and for similar reasons it should be possible to anticipate that their co-operation would be available.

(4) Substantial tonnage would be added to the traffic handled by the ships serving Beira and this ought to create the support of the Conference Lines of Steamship companies in the matter of freight charges.

(5) The site of production is only a matter of 1000 ft above sea level in a tropical climate. Health conditions would have to be safeguarded. Housing with the maximum ventilation possible would make for the comfort and health of the employees. The malaria mosquito would have to

be controlled. This has been done elsewhere and should not prove to be an insuperable difficulty. Holiday conditions for the European staff would have to be on a liberal basis. The example of the copper belt in Northern Rhodesia in regard to recreation facilities would require to be followed.

In conclusion the writer claims that there are sufficient grounds for believing that a detailed investigation of these deposits would show that a large scheme such as that set out would in fact be practicable, and it should be worth someone's while to take it in hand.

C-I to Provide Steel For New Atom Smasher

Pittsburgh

• • • **Steel for an atom** smashing cyclotron magnet designed to produce five times the maximum energy of any now operating will be manufactured here by Carnegie-Illinois Steel Corp., it was announced recently by this U. S. Steel subsidiary.

The atom smasher, which will be erected at the University of Rochester under joint Navy and university sponsorship, will take 1100 tons of steel forgings and plates, some of the forgings so huge that special freight cars will be necessary to transport them to the university campus. Universiy officials estimate it will take 18 months to 2 yr to complete the project, which will produce particles of more than 200 million electron volts.

The Navy Office of Research and Inventions and the University of Rochester are jointly financing the nuclear research program. The cyclotron will be owned by the Navy, but its construction and operation for basic research will be under the direction of the University of Rochester's physics dept., headed by Dr. George B. Collins. The 1100 ton cyclotron magnet compares with the 15 ton magnet on the university's present 7 million electron volt atom smasher.

Individual forgings weighing as much as 150 tons will be produced at Homestead district works of Carnegie-Illinois. Assembly of the equipment will take place on the campus at Rochester, N. Y.

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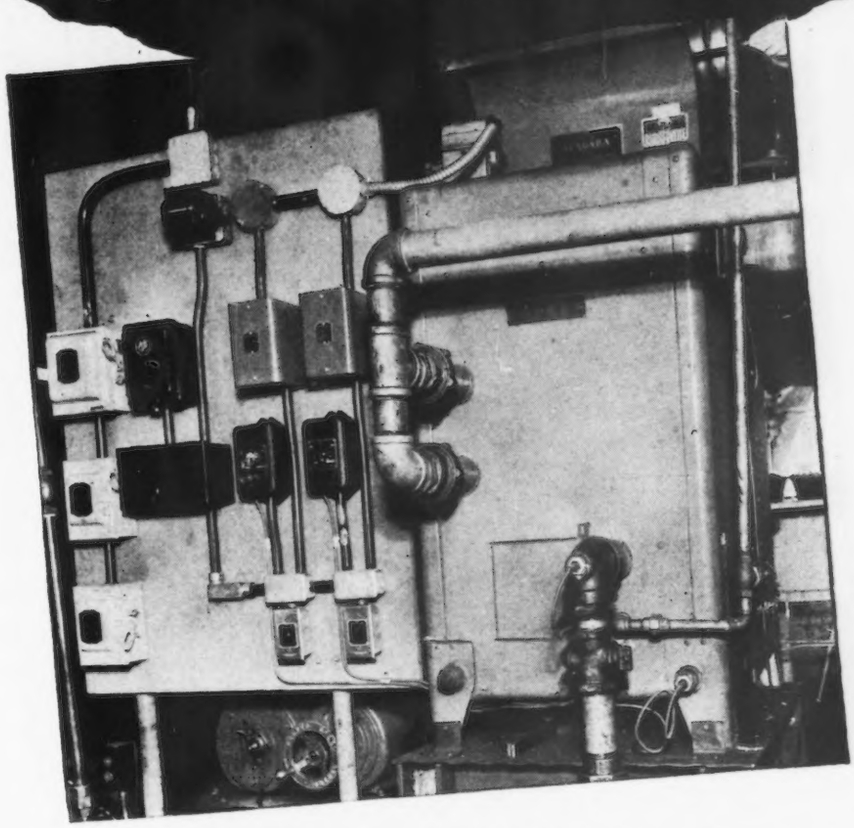

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Report Shows German Measuring Controls Behind U.S. Practice

Washington

• • • **German use of** automatic controls for measuring temperature, pressure, humidity, and other factors is about 10 to 15 yr behind current practice in the United States, according to four American experts who investigated the German industrial instrument industry under the auspices of the Technical Industrial Intelligence Div. of the Office of Technical Services, Dept. of Commerce. Development of industrial instruments in Germany is about 5 to 10 yr behind the American industry, in the investigators' opinion.

Fifty-three German plants using industrial instruments were visited by the investigators, whose names and business connections follow: A. D. Eplett, Manning-Maxwell-Moore, Inc., Bridgeport, Conn.; E. D. Haigler, Foxboro Co., Foxboro, Mass.; D. C. Lamb, Taylor Instrument Co., Rochester, N. Y.; and J. C. Peters, Leeds & Northrup Co., Philadelphia.

The wartime role of industrial instruments in Germany was small as compared with that in America, the investigators reported. Apparently enough low-cost labor was available to permit hand operation for most industrial measuring purposes. Also, large-scale use of the "batch" method of processing in Germany permits greater dependence upon hand controls than does the "continuous" method used in the United States.

Largely because of the strong influence exercised by the I. G. Farben cartel system, the German industrial instrument industry lacked control not only over the materials used, but also over the manufactured product, according to the investigators. In many cases, equipment could not be designed to fit a particular job because the processing plants were so closely restricted to protect trade secrets that instrument manufacturers were not allowed to send technicians into them to study their special needs.

The investigators' 131-page report on the German plants and equipment inspected is available from OTS (Study of the Industrial

Processing Instrument Industry in Germany; PB-4600; photostat, $9; microfilm, $1.50).

Copies of sales catalogs and other German documentary material obtained by the investigators in Germany will be placed on sale by OTS in the near future.

Orders for reports should be addressed to the Office of Technical Services, Dept. of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

U.S. Group Organizes Philippine Shipyard; 200 Men to Fly There

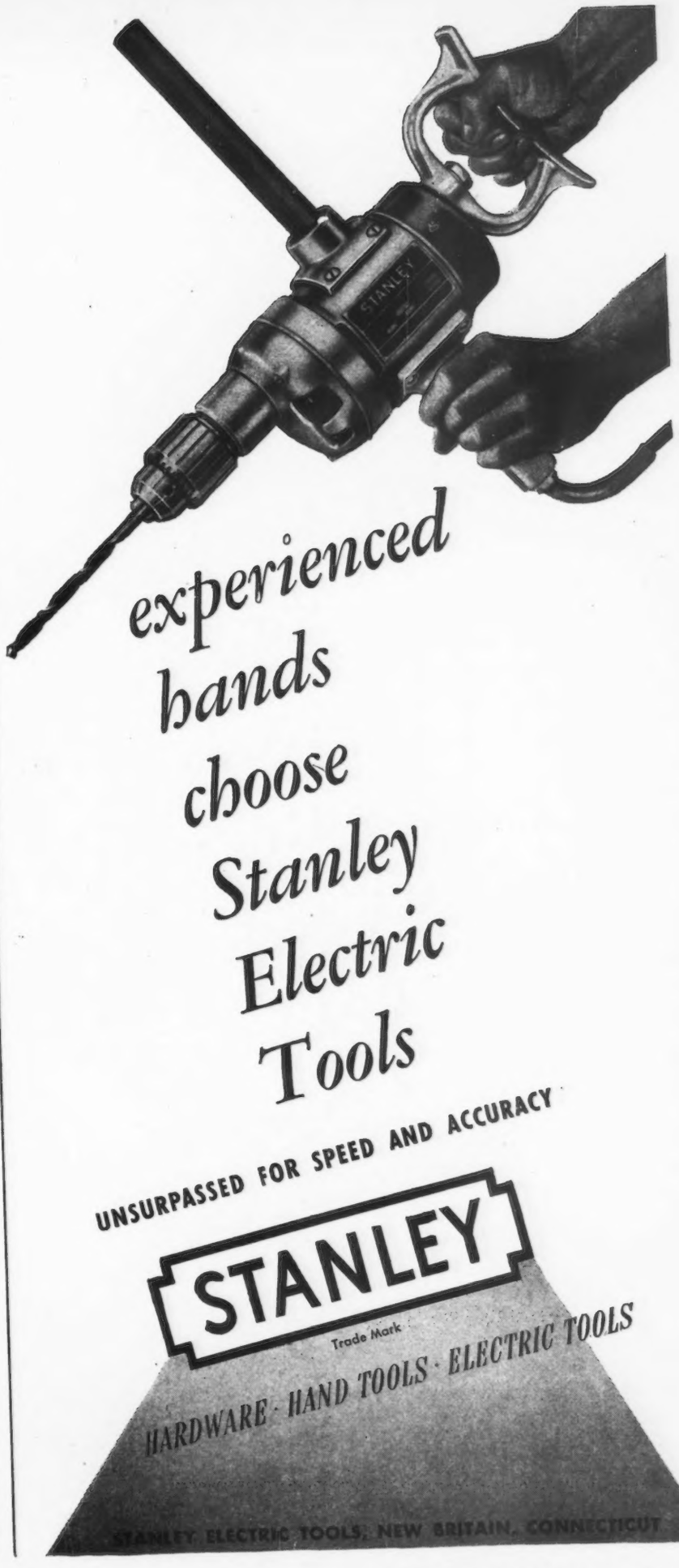
Los Angeles

• • • **With an initial** contract for repair, conversion and construction of several hundred small Navy craft, the newly organized Philippine Consolidated Shipyards has begun operations at Manicani Island, off the coast of Samar, Philippine Islands.

The organization, headed by Alden G. Roach, who is also president of Consolidated Steel Corp. of Los Angeles, is a joint venture of Consolidated and the Philippine Industrial Equipment Co. which is affiliated with the Industrial Equipment Co. controlled by S. D. Bechtel, K. K. Bechtel and John A. McCone. Morrison Knudsen Co., Inc., K. D. Dawson and Andres Soriano also have an interest in the organization.

Field operation will be under the sponsorship and direct supervision of Consolidated Steel Corp. personnel, supplemented by men who, for a period of years, have been associated with various Bechtel Bros. and McCone activities. Field operations will be under the direction of C. W. Lee of Consolidated Steel Corp. as general manager, and George S. Colley, vice-president of the Philippine Industrial Equipment Co., who has long been connected with W. A. Bechtel Co.

Approximately 200 engineers and other key personnel drawn from the associated groups are being transferred by air to the Philippines. About 2000 employees, including native labor, will be engaged in this first ship repair operation, with additional employees to be added to meet future requirements. Existing drydocks and facilities will be utilized and may be expanded.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Foresees Rocket Radio With Moon-to-Earth Broadcasts Possible

Pittsburgh

• • • **A compact** "rocket radio" weighing less than 100 lb and with sufficient power to send its signal 240,000 miles from the moon to the earth is technically possible, according to Dr. J. A. Hutcheson, associate director of the Westinghouse Research Laboratories, in referring to recent rocket forecasts by the Army Air Force guided missile branch. A 100-w transmitter capable of beaming ultrashort waves from the moon to the earth would weigh less than 50 lb and its power supply, consisting of several automobile storage batteries, would require only an additional 50 lb.

Continuous operation during the trip to the moon, which Dr. Hutcheson estimated at 60 hr at a speed of 4000 mph, would apply too heavy a drain on the batteries. He proposes an electric clock mechanism to turn on the radio for 1 min each hour. Operated in this manner, the batteries would last for several days after landing on the moon's surface.

The proximity fuse developed during the war holds the key to providing a 'soft' landing for moon-rockets. As explained by Dr. Hutcheson, a tiny radio set would detect the approach of the rocket to the moon's surface. This automatically would turn on reverse rockets and turn off forward rocket power. By starting reverse power at the right moment in this application, these proximity radio sets would make possible rocket landings without damaging delicate instruments.

Dr. Hutcheson heads research in microwaves and radar as well as nuclear physics at Westinghouse. He recently returned from the second atom bomb test at Bikini where he acted as special representative for the Manhattan Project.

Goodrich Head Makes Plea for Free Market Basis on World Rubber

Akron

• • • **Recommendations that** "serious consideration be given" to returning crude rubber to a free-market basis at the end of this year, and that the government sell or lease to private industry its facilities for producing American-made synthetic rubber as soon as the world shortage in rubber supply is eased, were made here by John L. Collyer, president of The B. F. Goodrich Co.

Mr. Collyer's appraisal of supply, progress, costs and outlook for crude and American-made rubber "at the first anniversary of VJ-Day" was the ninth in a series of rubber studies the company has issued since the day in 1940 when it first put on the market auto tires made with American-made rubber "to call attention to the nation's vulnerability with respect to supplies of rubber." This report comes at the halfway point in rubber's generally accepted 2-yr postwar "transition period."

Establishment of free market conditions, the Collyer analysis pointed out, would be the first step toward achieving the economic benefits long foreseen as chief by-products of the coming competition between crude and American-made rubber. He listed these benefits as lower-cost finished products, wider use of rubber in new applications, boadened markets and increased employment possibilities.

As things stand now, the study shows, general-purpose rubber could be manufactured and sold by private industry at a 600,000-tons-a-yr rate for between 15 and 17¢ a lb—including plant amortization, selling expense and return on invested capital. The current USA delivered cost of Far East crude rubber is between 25 and 26¢ a lb.

"For the present, of course," the Collyer report says, "world-wide demand for rubber is such that it is impossible to get a true picture of how preference for crude rubber will stand up with the indicated differential of 8¢ or more a lb." However, it said that "some time in 1947" the available supplies will be "such as to allow

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manufacturers a free choice of one or the other—or both in varying combinations—on the sound basis of price relation to finished-product performance."

In urging that the government proceed with the program, recommended by the Inter-Agency Committee on Rubber, of selling or leasing to industry the American-made rubber producing facilities, the B. F. Goodrich president again reiterated the warning he first made in June of 1943, that in all postwar decisions on rubber policy the matter of military security be the foremost consideration. His proposals have been maintenance, "in plants kept in condition and ready to run," of 600,000 tons standby capacity, and minimum actual production and use of 200,000 tons a yr from those plants.

Discussing technical progress, the study said that "as of now, and taking the realm of large-tonnage uses as a whole, crude rubber still has the advantage in performance." It added, however, that great progress has been made since the early months of this country's experience in using American-made rubber, in (1) the rubber itself, notably in making improved variations of the main-type rubber formula; (2) compounding; (3) products construction, through greater use of rayon and other man-made filaments, and (4) in designing products, such as the passenger-car tire his company is now making that actually outwears prewar natural rubber tires.

The B. F. Goodrich study included a chart outlining probable world consumption of rubber for the first three postwar years. It indicated that the United States' total rubber consumption requirements would be one million tons this year, 900,000 in 1947, and 800,000 in 1948—still well above the 651,000 tons consumption of 1940, last normal prewar year. The predicted minimums of American-made rubber to meet consumption needs were shown, as: 740,000 tons this year; 500,000 in 1947, and 250,000 in 1948. Over the same period, crude rubber supply to this country was forecast as 360,000 tons in 1946, 500,000 in 1947, and 650,000 in 1948. In each of these years 100,000 tons would be going into the building of adequate working stocks and stockpiling.

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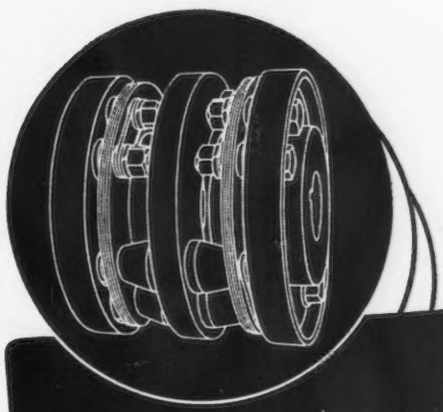

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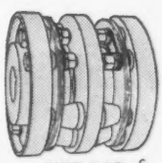
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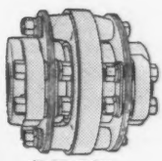
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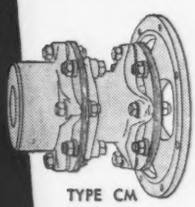
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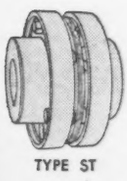
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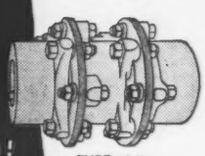
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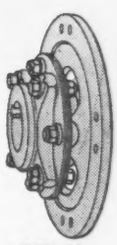
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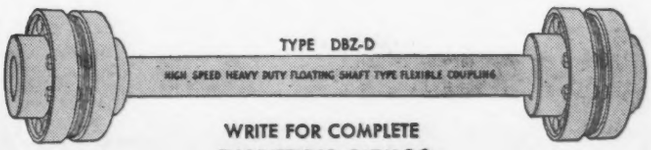

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Safety Code Set Up For Seized Coal Mines

Washington

• • • **Government seized coal mines were recently brought under a safety code drawn up under the terms of the existing contract between the government and the United Mine Workers. Secretary of the Interior J. A. Krug said that is the first time in the history of the industry that an all-inclusive group of safety standards has been made applicable to a vast majority of the nation's bituminous coal and lignite mines.**

Officially known as the "Federal Mine Safety Code for Bituminous and Lignite Mines of the United States," the safety standards cover practically every phase of operating conditions and practices in coal mines. The code was formulated by Dr. R. R. Sayers, Director of the Bureau of Mines, with the assistance of representatives of mine operators, the union, and the office of Admiral Ben Moreel, Coal Mines Administrator. It will remain in effect as long as the government is operating the mines under the Krug-Lewis agreement.

Inspectors of the Bureau of Mines will make periodic inspections of the mines and report all violations of the new standards to the Coal Mine Administrator through the Director of the Bureau of Mines, according to the code, with the Coal Mines Administrator charged with the enforcement of the code and the correction of violations.

SAE Air Group Plans West Coast Meeting

Los Angeles

• • • **Among the topics to be considered at the SAE National Aeronautic Meeting and Aircraft Engineering Display to be held October 3 to 5 in The Biltmore Hotel, Los Angeles, are jet propulsion, passenger comfort, power controls, air transport regulation, and comparative studies of the techniques of flight employed by men, insects and birds. The program, announced by general manager John A. C. Warner of the Society of Automotive Engineers, calls for discussion by outstanding aeronautical engineers of many pertinent engineering developments of the war and postwar periods.**

Special motion pictures of bird and insect flight made by the Army Service Forces and the Sperry Corp. will be shown at a general evening session Friday, Oct. 4. W. B. Stout, consulting engineer, Detroit, will speak on the subject "A New Approach to the Flight Problem." Brig. Gen. John C. Gordon, Deputy Commanding General, Air Materiel Command for Plans, Wright Field, Ohio, will speak on "Plans for Industrial Air Preparedness."

The meeting is sponsored by SAE aircraft, aircraft powerplant, and air transport engineering activities with the cooperation of the SAE Southern California, Northern California, Oregon and Northwest sections. Dr. A. L. Klein of Douglas Aircraft Co., Santa Monica will act as general chairman.

Canadian Ore Mine Makes Monthly Record

Toronto

• • • **Steep Rock** Iron Mines, Ltd., made a new monthly record in August by shipping 170,000 tons of high grade iron ore from its Steep Rock Lake property north of Atikokan, Ont. This brings the company's total shipments for the year to date to 472,000 tons. It is stated by officials that August shipments would have been exceeded by 50,000 tons if sufficient ore cars were available and the Port Arthur ore docks could have handled the additional tonnage.

Steep Rock Mines is now in a position to produce 10,000 tons of ore per day and September shipments are expected to reach 250,000 tons, providing railroad and dock handling facilities are available. Officials have hopes of shipping 1,000,000 tons this year if the Great Lakes freeze-up does not come too quickly.

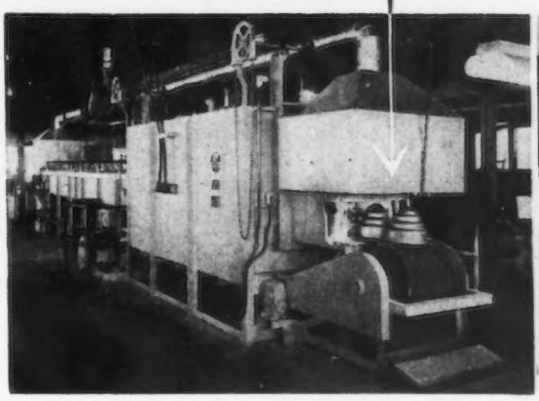
WAA Seeks Foundry Bids

Washington

• • • **WAA's Philadelphia** regional office will receive bids for the purchase or lease of the $1 million steel foundry in Easton, Pa., operated during the war by Lehigh Foundries, Inc. Also offered for sale or lease is the Revere Copper & Brass, Inc., tube and pipe plant in the heart of Baltimore's industrial district.

Brazing AND ANNEALING

Steel, Aluminum, Brass, Copper and Silver Products are Securely Joined or Uniformly Heat Treated in EF FURNACES . . .



A continuous mesh belt conveyor furnace used for brazing and bright annealing. Has belt 24" wide and handles products up to 13" in height.

Discharge end of an EF continuous roller hearth furnace brazing heavy steel assemblies.

An EF forced circulation automatic tray conveyor combination brazing and heat treating furnace.

Lower production costs, stronger joints, more uniform results, improved appearance, increased production and savings in time, material and weight. These are some of the advantages reported by users of EF brazing furnaces in the production of their ferrous and non-ferrous parts and assemblies.

Many EF furnaces are used for bright annealing and other heat treating processes as well as for brazing. The above illustrations show only three of the numerous types we build.

Assemblies ranging in size from small radio tube parts up to large automotive, aircraft and refrigerator units are being neatly and economically joined in EF continuous and batch type furnaces.

Many products which previously were difficult or expensive to make in one piece, are now being made in several pieces and brazed in a fraction of the time and at a fraction of the cost

Any number of joints can be made in the same assembly, or any number of pieces can be joined at one time.

• Investigate the advantages of EF furnaces for your joining and heat treating processes.

We will be glad to put samples of your products thru one of our furnaces to show you the results you can expect, and give you an estimate of the cost of equipment to handle your products together with operating costs, if interested.

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No Job Is Too Large or Too Unusual

Gallup Polls

(CONTINUED FROM PAGE 101)

at random from the survey:

"They took the lead in a good cause but in the wrong way . . . Except for resorting to violence, I approve of the action . . .

"They've got the spirit everyone should have . . . They are on the right track; more ought to do that . . . That's the way to clean up crooked politics . . . Sometimes the only way to clean up a mess is to get tough . . .

"The veterans were wrong; in this country law and order should not be taken into individual hands . . . This country doesn't accept things like that—we're supposed to use ballots not bullets . . ."

The Athens veterans charged that agents of the McMinn County political machine had taken the ballot boxes after election to stuff them with fraudulent ballots in order to defeat candidates put up by the veterans. The angered ex-servicemen stormed the jail where the deputies were hiding and finally forced surrender after many shots had been fired.

London Economist

(CONTINUED FROM PAGE 105)

is how long we ought, for our own sakes, to spend time trying to live at peace with her. Both opinions exist within, as without, the State Dept.

Behind these attitudes, and giving them added force, stretches the long series of face changings that have made Russia look more and more like the dragon that shifts its shape at will. For those who view her present metamorphosis with too much concern it is well to recall at least the timings of her recent masks.

From October, 1936, to March, 1939, she was the only European nation that aided the embattled Spanish Republic, and that, in the eyes of those who saw that war as a dress rehearsal for Nazi-Fascist aggression on a larger scale, made her the momentary champion of the democratic ideal. Then the revolting generals, with Mussolini and Hitler, won.

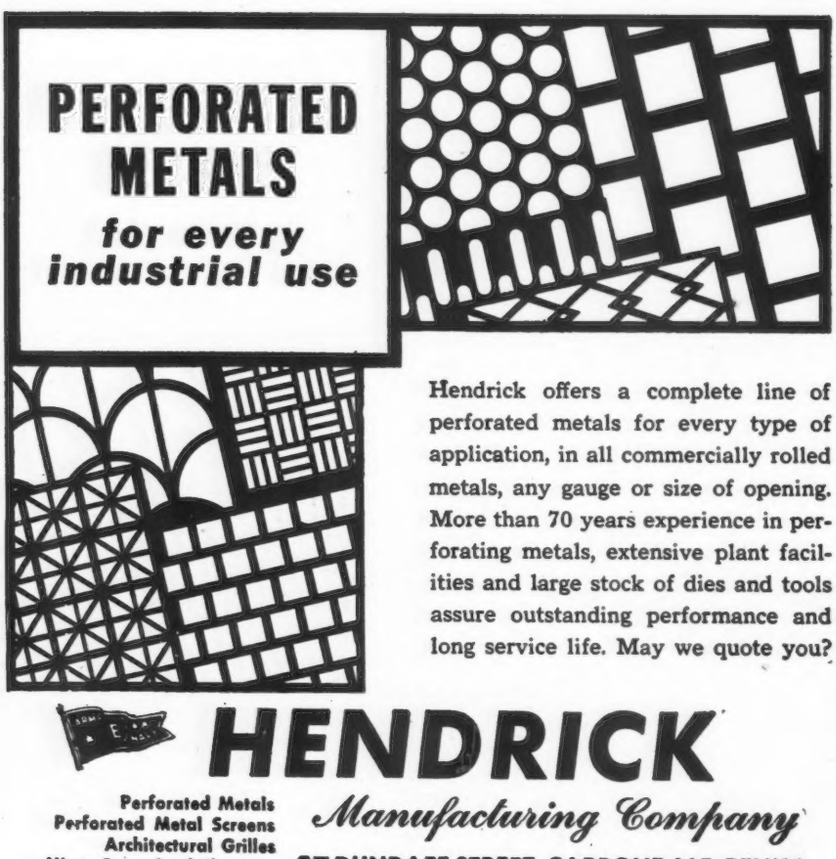
Five months later Russia turned up as the friend of Hitler, with a signed pact to prove it. All her liberal admirers dropped away, and for the period of her war on little Finland she was detested and derided.

In June of 1941 Hitler turned on his ally. This time Russia shed wolf's clothing overnight and became a woolly lamb, white and pitiable and bound for slaughter. American communists, claiming that her friendship with Hitler had been a ruse behind which she had gained necessary time for arming to help the democracies, clamored for sympathy, and American liberals gave it. Wise guys predicted she would not last six weeks, and behind the fervor of their predictions lay the hope that in the conflict both she and Nazi Germany might be destroyed.

Bit by bit the woolly lamb stiffened, strengthened, became the bear at bay — first Britain's ally and then America's. From January 1943, when she made her stand at Stalingrad until the war ended, she was the big new friend with whom we were, just as soon as the Japs surrendered, to embark on the great adventure of learning to live in one world.

That illusion faded more slowly; vestiges of it still linger in the air. The catalytic act causing the change was America's, Russia's reaction to it was quick, the American perception of that reaction slower. The atomic bomb was dropped in August 1945. Two days later Russia declared war on Japan, eight days after the bomb went off Japan surrendered, six weeks later Molotov criticised American action in occupying Japan and asked for a joint control commission in which Russia would have a share. For a moment the whole country stiffened, then relaxed as President Truman explained that Mr. Molotov had not meant what he said.

The fifth quick change, the period of "let's pretend," was on. Russia seemed not to love us any more, but that, we were told, was due to misunderstandings heightened by



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her inexperience in the world of international give and take. If only we could meet on a common basis of friendship and understanding all would be well. The Council of Foreign Ministers' meetings began shortly thereafter.

Secretary Byrnes's report of July 15 on the Paris meeting of the Council of Foreign Ministers ushered in the new realism. Referring to the "great struggle and tremendous difficulties" which the four Governments faced, he warned Americans that "in the long run we shall have a much better chance to work out our problems if we and our Allies recognize the basic difference in our ideas, standards and methods instead of trying to make ourselves believe that they do not exist or that they are less important than they really are."

His fellow-citizens hoped he had hold of the right end of the stick. At least this promised action, which to the American mind is always preferable to worrying, even when it is the wrong action. On the purpose of the action they might not be agreed, but at least things were moving. On the desirability of that minimum, American opinion is united.

Executive Poll Shows Human Relations to Be Prime Responsibility

New York

• • • **An opinion by management** leaders in virtually all classes of industry that business must subordinate all else in the selection of executives to the element of human understanding, is expressed in the annual report of the American Management Assn. for 1945-1946.

The report is a consolidation of views from a cross-section survey of executives in widely varying capacities in all types of industry. Qualified by long experience and practical accomplishment, those queried were in the main directors, vice-presidents and planning council members who guide activities of the 10,000 members of AMA's industrial relations, production, finance, insurance, marketing, packaging and office management divisions.

In a foreword to the report, Alvin E. Dodd, AMA president, points out "the manager is a person

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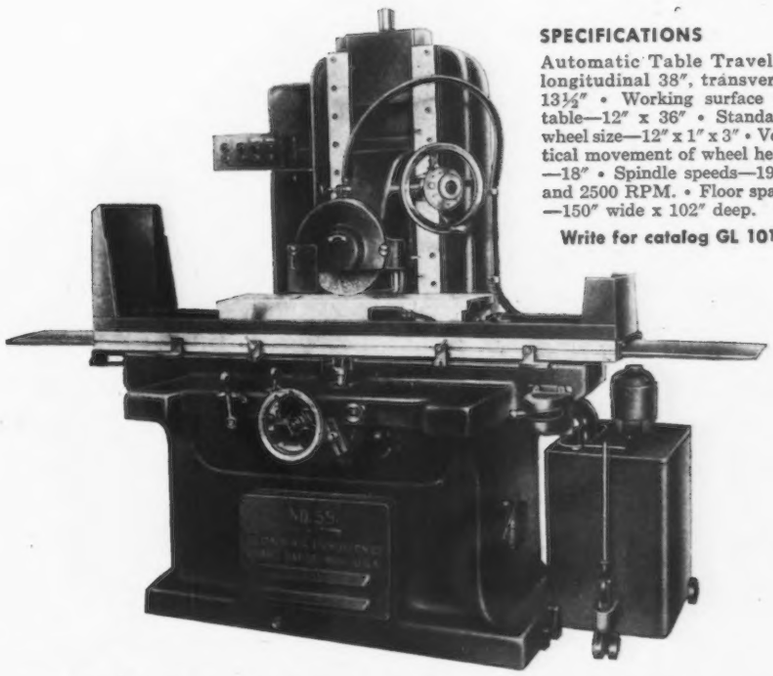

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of first importance to some forty odd million Americans who spend most of their daily lives in the office or in the factory. Decisions of the manager—foreman, department head, or company president—have a far more intimate effect on the lives of the average working citizens than do the deliberations of our Congress or state legislatures."

"We have cried out our sincere belief that people are the basis for the success of the business enterprise," Mr. Dodd states, "but we have selected our managers almost exclusively on the basis of technical proficiency and knowledge."

Mr. Dodd said the survey which led to the formulation of management standards in human relations was undertaken because almost all AMA activities based on the association's continuous surveys of industrial problems in 1945-1946 showed industry "preponderantly concerned with the development of human beings in the industrial organization."

The officers of the association, he said, felt it would be useful to determine the managerial qualifications considered by successful executives themselves to be essential to administration of human relations in industry.

Included in the report is a checklist for evaluating the qualifications and performance of business management and executives in understanding and guiding the individuals and groups that comprise the nation's industrial organizations.

The report, "Management Appraises Its Job," states it presents no magic formulas but simply certain mature data that can aid the manager in understanding the social mechanism in industry and aid the stockholder, the employee, the consumer and the general public in evaluating the performance of management.

One section of the report poses questions to be used in evaluating accomplishment of companies in industrial understanding. Among them are:

"Are the policies determined by the organization or by one man? Does the manager spend a definite amount of time with his subordinates? Is he building men and moving them along.

"Does the manager give evidence that he feels it is his responsibility to see that his fellow employees are mentally and economically healthy? Is there clear evidence that established procedures are currently and continuously being used for the clarification of inter-departmental and individual relationships? Is the confidence of the community in which the manager operates indicated by his participation and acceptance in local and national civic, professional and trade activities? Does the stock market reflect the confidence of the stockholders and do sales reflect the confidence of the consumer?"

Recognition of the fact that people will no longer do things simply because they are told to do them is stressed in a part of the report, assigned to personal characteristics of executives, which states a talent to direct associates in a way that will instill enthusiasm and self-respect is required.

Continuing counsel of employees, a sound sense of values which enables the manager to align his company's objectives with social objectives in general, the proper combination of intelligence, attitudes, emotions and sensitivity to people and environment are discussed as necessary factors. Decisiveness, judgment, tolerance and the ability to recognize and implement others' ideas are also enumerated and defined.

The report also lists as important "the fundamental necessity of maintaining two-way communications between employees and management to minimize difficulties and misconceptions, to remove fear, doubt and suspicion from the minds of workers and replace this destructive thinking with constructive understanding."

Knowledge of the philosophy and principles of management, organization and the specifics of the particular industry, education, appearance and ability to influence are other basic qualities listed.

"Management would do well to study its 'competitors'—government and union leaders," the report states, "who have succeeded in awakening cooperation and increasing morale among their constituents while at the same time taking money from them in the form of taxes and dues."

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